

# CORNELL UNIVERSITY OFFICIAL PUBLICATION

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Announcement of the  
College of Arts and Sciences  
for 1930-31

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## THE UNIVERSITY CALENDAR FOR 1930-31

1930		FIRST TERM
Sept. 15,	<i>Monday,</i>	Entrance examinations begin.
Sept. 22,	<i>Monday,</i>	} Registration and assignment of new students.
Sept. 23,	<i>Tuesday,</i>	
Sept. 23,	<i>Tuesday,</i>	} Registration and assignment of old students.
Sept. 24,	<i>Wednesday,</i>	
Sept. 25,	<i>Thursday,</i>	Instruction begins at 8 A. M.
Oct. 17,	<i>Friday,</i>	Last day for payment of tuition for the first term.
Nov. 26,	<i>Wednesday,</i>	Instruction ends at 6 P. M. }
Dec. 1,	<i>Monday,</i>	Instruction resumed at 8 A. M. } Thanksgiv-
Dec. 20,	<i>Saturday,</i>	Instruction ends at 1 P. M. } ing Recess
1931		} Christmas Recess
Jan. 5,	<i>Monday,</i>	
Jan. 11,	<i>Sunday,</i>	Instruction resumed at 8 A. M. }
Jan. 26,	<i>Monday,</i>	Founder's Day.
Jan. 26,	<i>Monday,</i>	Term examinations begin.
Feb. 4,	<i>Wednesday,</i>	Term ends.
Feb. 5,	<i>Thursday,</i>	A holiday.
SECOND TERM		
Feb. 6,	<i>Friday,</i>	Registration of all students.
Feb. 9,	<i>Monday,</i>	Instruction begins at 8 A. M.
Mar. 2,	<i>Monday,</i>	Last day for payment of tuition for the second term.
Mar. 28,	<i>Saturday,</i>	Instruction ends at 1 P. M. }
April 6,	<i>Monday,</i>	Instruction resumed, 8 A. M. } Spring Recess
May 23,	<i>Saturday,</i>	Spring Day: a holiday.
June 1,	<i>Monday,</i>	Term examinations begin.
June 9,	<i>Tuesday,</i>	End of term examinations.
June 15,	<i>Monday,</i>	COMMENCEMENT.

# COLLEGE OF ARTS AND SCIENCES

## FACULTY

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## COURSES AND REQUIREMENTS

Regarding admission to the College of Arts and Sciences, the General Information Number should be consulted.

Two courses are offered in the College of Arts and Sciences, one leading to the degree of Bachelor of Arts, the other leading to the degree of Bachelor of Chemistry.

Neither degree will be conferred upon any student who has not been in residence at Cornell University during the last two terms preceding graduation, nor upon any student who has not been in residence at least two terms in this College, and in this College only.

For the degree of Chemical Engineer, see p. 20.

A student who does not pass twelve hours in any term, with a grade of C or better in at least six of the twelve hours, will be either dropped or placed upon probation. The same penalties may be imposed on students of this College who, having registered in the Summer Session, do not pass four hours of their Summer Session registration, with a grade of C or better in at least two hours.

A student's general record may be so unsatisfactory that the Faculty will refuse him permission to continue in the College even though he has passed twelve hours in the preceding term.

A student failing in the last term of his senior year to pass twelve hours—or, if in a summer session, four hours—may not be recommended for his degree except under such conditions and at such time as the Faculty may designate.

### REGISTRATION

Students will file their study cards at the office of the Dean in accordance with instructions issued at the time of registration.

With the consent of the Dean and the approval of his adviser, a student may alter his list of courses during the first six days of instruction. Thereafter, no student will be permitted to cancel his registration for any course in which he is registered, unless he shall previously have obtained from the Dean authorization to do so on the ground of ill health, or for other reasons beyond the student's control.

### THE GEORGE C. BOLDT MEMORIAL SCHOLARSHIPS

Mr. George C. Boldt, jr., has created three scholarships of the annual value of five hundred dollars each, as a memorial to his father. These scholarships will be awarded at the close of the junior year to the three male students of the College who shall be considered most deserving of this aid. Applications for these scholarships must be filed in the Office of the Dean before March 15 of the academic year preceding the year for which they are awarded.

## THE DEGREE OF BACHELOR OF ARTS

## I. REQUIREMENTS FOR GRADUATION

1. Credit for one hundred and twenty hours, of which at least ninety hours must be for courses given in the College of Arts and Sciences. Course 1 in Music may be counted as part of the thirty hours which a student may elect outside the College of Arts and Sciences, but may not be counted as part of the ninety hours required in the College. This rule applies also to Military Science 2 and Hygiene 1, 2, 3, 4, 5, and 6.

2. A grade of C or better in at least sixty of the required one hundred and twenty hours. (See Section IV: Marks.)

3. Election of courses in accordance with Section III, Course of Study.

4. Completion of the work in Hygiene and Preventive Medicine, and in Military Drill or in Physical Training prescribed by the University Faculty. (See pages 83-85.)

## II. SPECIAL PROVISIONS REGARDING CREDITS TOWARD GRADUATION

5. **In Summer Session.** To obtain credit by means of work done in summer sessions, a student must previously have satisfied the entrance requirements of the College, and must obtain in advance the Dean's approval of his selection of courses. Credit for a maximum of thirty hours, but no more, may be secured in this way.

Credit will be allowed, under the same restrictions, for work done in summer sessions of other universities belonging to the Association of American Universities, by a student regularly registered in this College, but permission to offer such credit must be obtained in advance from the Dean of this College.

6. **Admission to Advanced Standing.** A student admitted to the College of Arts and Sciences from another college of Cornell University, or from any other institution of collegiate rank, will receive credit toward the degree of Bachelor of Arts for the number of hours to which his records may, in the judgment of the Faculty, entitle him. In order, however, to obtain the degree of Bachelor of Arts, he must, as a candidate for that degree, have been in residence at least two terms in the College of Arts and Sciences, and in that college only.

Credit toward a degree for work done in a preparatory school, upon subjects (numbers 1-18 inclusive) which may be offered for entrance to the University, may be given only to those students who, in addition to satisfying all entrance requirements, pass separate examinations in the subjects for which they seek college credit. These examinations will cover substantially the same ground as the University courses in the corresponding subjects. An applicant who desires a college credit examination of this kind must apply to the Office of Admissions as early as possible and in no case later than the day preceding the beginning of the entrance examinations, specifying which fifteen units he intends to offer in satisfaction of the entrance requirements, and upon what other entrance subjects he wishes to be examined for college credit.

In case he fails to satisfy the entrance requirements in any one or more of the subjects which he has offered for entrance, but passes the college credit examination in any other subject or subjects, he may use the latter for satisfying the entrance requirements, but in that case he cannot also receive college credit therefor. The college credit examinations will be held on the date set for the entrance examinations in the same subjects, and, unless otherwise arranged, only at Ithaca.

A candidate using No. 19 of the list of University entrance subjects (see Table II, page 8, General Information Number) to make his fifteen units, may not apply for a college credit examination as described above.

7. **Registration in Two Colleges of the University.** A student who has completed at least ninety hours in courses given in the College of Arts and Sciences may, with the permission of the Faculties concerned, be registered both in the College of Arts and Sciences and also in the Medical College or the Law School. (See paragraph 12, division a.) It should be noted, however, that admission to the Medical College is closely restricted, and that in recent years the Medical College has been able to grant this privilege of double registration to only a small proportion of the fourth year students of the College of Arts and Sciences who applied and were formally eligible for it. Students who contemplate obtaining the A. B. and an Engineering degree by a combined six-year course, are urged to consult the Dean's Office.

8. **Registration in the College and in the Graduate School.** A student who has satisfied all the academic requirements for graduation may, with the permission of the Graduate School, register both in the College of Arts and Sciences and in the Graduate School.

### III. COURSE OF STUDY

9. **Number of Hours.** A student must register in each term for at least twelve hours of work. No student may register for more than eighteen hours in any term except by permission of the Dean. A student who has not attained in any academic year a grade of C or better in a total of fifteen hours of work will not be permitted to elect more than fifteen hours of work in either term of the subsequent academic year. A student on probation may not register for more than fifteen hours in the term of his probation. For registration in a course not in the College of Arts and Sciences, the permission of the Dean of this College and of the Professor in charge of the course must be obtained. (See also paragraph ii under IIC below.)

10. **Prescribed Studies.** Prior to graduation, a student must complete six hours in each of the first two groups listed below and six hours in each of five of the remaining six groups:

1. English and Public Speaking.
2. Foreign Languages.
3. History.
4. Astronomy, Chemistry, and Physics.
5. Biology (including Botany and Animal Biology), and Geology.
6. Philosophy and Psychology, including Educational Psychology.

7. Economics and Government. (For the present, Economics 1, five hours, will be accepted in satisfaction of this requirement.)
8. Mathematics.

Of these hours, the student is required to take at least twelve, and advised to take more, in his freshman year.

## 11. Underclassmen.

a. *Underclass Requirements.* To attain upperclass standing each student is required to complete, in addition to the first two groups mentioned in paragraph 10 above, at least eighteen hours in five of the remaining six groups. Each six hours may be entirely in one division (for example, English six hours), or partly in one and partly in another (for example, English three hours and Public Speaking three hours). The following courses in foreign languages may not be applied in satisfaction of the foreign language requirement: Greek, 1a, 1b; German 1, 1a, 3, 3a; French 1, 3; Spanish 1, 3; Italian 1. College credit gained by examination at entrance may not be applied in satisfaction of any of these underclass requirements.

These requirements must be completed before a student may begin counting hours in an upperclass group. (See paragraph 12 below.)

b. *Underclass Advisers.* Freshmen and sophomores are under the jurisdiction of the Advisory Board for Underclassmen. Each freshman will be assigned to a member of the Faculty who will act as his adviser during his freshman and sophomore years. The function of the adviser is to assist the student in his choice of studies, to advise him during the term regarding his work, and generally to give him friendly counsel. The approval of the study card and the signature of the adviser must be obtained before the study card is filed at the office of the Dean.

## c. *Courses Open to Freshmen.*

i. The following are the courses in the College of Arts and Sciences open to freshmen, except that (1) a student may not register for any of these courses for which he has not satisfied the prerequisites, if any are specified (see announcement under each course); (2) a student may not register for any of these courses for which he has presented an acceptable equivalent at entrance:

Animal Biology 1, 302, 303

Astronomy 181, 183

Biology A

Botany 1

Chemistry 101, 105, 205, 210, 225, 875

English 3, 4

French 1, 3, 4a, 4b, 5a, 5b, 6

Geology 100, 101, 200, 201, 311, 400

Government 1

German 1, 1a, 3, 3a, 4, 5, 8

Greek 1a, 1b, 2a, 2b

History 1, 61

Italian 1, 4

Latin 1a, 1, 2, 3

Mathematics 1, 2, 2f, 3, 4, 5, 7, 15

Music 1 by examination (see page 65)

Philosophy 2a

Physics 3, 4, 6, 7, 7a, 8, 8a

Spanish 1, 3, 4, 5, 6

ii. Subject to the permission mentioned in paragraph 9, required courses in other colleges in the regular freshman schedule of those colleges may be elected by a freshman in the College of Arts and Sciences, but only after the approval of the Dean of the College and of his adviser has been obtained.

iii. Under exceptional circumstances, a freshman may by petition secure permission from the Advisory Board for Underclassmen to take courses (including freshman electives in other colleges) in addition to those allowed under i and ii.

d. *Informal Study.* At the beginning of their second year, sophomores not exceeding fifty in number may register for informal study under the general supervision of the Advisory Board for Underclassmen. To each sophomore so registering, three hours of supplementary credit will be given at the end of the term. Applicants for the privilege of informal study will be selected, in the order of their scholastic standing, from those students who have a grade of B or better in one-half the hours they have passed. Students admitted to the privilege may not register for more than four formal courses, and those formal courses shall not total more than fifteen hours. Continuance in the privilege for the second term will depend upon a student's maintaining an average of B in the total number of hours for which he is registered in the first term. For necessary purposes of grading, the mark in these hours of supplementary credit will be considered the same as the student's average, for the term, in the formal courses for which he is registered. Students eligible for sophomore informal study will be notified before registration for the first term.

## 12. Upperclassmen.

a. *Upperclass Requirements.* When a student has completed sixty hours including the underclass requirements (see paragraph 11a above) he may select an upperclass group. Prior to graduation, he must complete at least twenty hours of work in the group selected, but courses marked with an asterisk (\*) may not be counted toward this requirement. With the sanction of his adviser and of the Dean, a student may choose, instead of one of the upperclass groups listed below, a combination of two related groups. A student registered in this College and in another college of Cornell University is excused from ten of these twenty hours. (See paragraph 7.) Upperclassmen should note that they may receive only four hours credit in History 61, French 1 and 3, Spanish 1 and 3, though these are six-hour courses for underclassmen.

b. *Upperclass Advisers.* In choosing his course, an upperclass student must obtain the advice and approval of some professor or assistant professor in his major subject whose signature on the study card must be secured before it may be filed.

c. *Upperclass Groups.*

1. The Classics.
2. Botany.
3. Chemistry.
4. Economics.
5. English and Public Speaking.
6. French and Italian.
7. Geology and Physical Geography.
8. German.
9. History and Government.
10. Mathematics.
11. Philosophy and Education.
12. Philosophy and Psychology.
13. Physics.
14. Animal Biology (Physiology and Biochemistry, Anatomy, Histology, Embryology, Zoology and Entomology).
15. Psychology and Education (including Physical Education).
16. Spanish and Italian.
17. Comparative Study of Literature (with English and Classics).

d. Two plans of *informal study* are open to certain upperclassmen.

i. One plan is an extension, into the junior and senior years, of the privilege also open to sophomores of high scholastic standing (see the paragraph *Informal Study* on p. 15). Informal study of this kind is restricted for the present to fifty of each class, chosen in the order of their scholastic standing, who have an average of B or better for the previous year. Informal study of this kind may not count in fulfillment of the upperclass group requirement.

ii. Upperclass group requirements may be satisfied in part by a second plan of informal study, however, in those departments which provide for such study as a part of the programme of the upperclass group. Informal study in such departments may be applied for by any student who has completed the underclass requirements, and who has at least sixty hours of credit with a grade of B or better in one-half of the hours he has passed. Students may pursue informal study in either the junior or the senior year, or in both years, under the following conditions:

Informal study during the first, or junior, year will consist of specified readings and reports, or of experimentation and problem work, which are intended to furnish the student with opportunities for the expression of initiative in his major field of study. This informal study will be supervised by the student's upperclass adviser, and will entitle him to such credit as his adviser is willing to grant for the work the student has completed, provided that no credit in excess of three hours a term shall be given for informal study in the junior year.



The same plan may be followed in the senior year, again entitling the student to a variable amount of credit, not in excess of three hours a term, for informal work done under the supervision of his adviser.

In a department, or departments, constituting an upperclass group in which there is a seminary meeting at least once a week for the purpose of giving tutorial assistance to the students accepted for informal study, the amount of credit obtained by such students may be extended to a maximum of six hours a term during the senior year; provided that, at the close of his senior year, and before his adviser reports credit for this informal work, the student shall have passed successfully a comprehensive examination in the field of study of his upperclass group. (For the degree of Bachelor of Arts with Honors, see page 17, *infra*.)

*Theses.* During his last two terms of residence any candidate for the degree of Bachelor of Arts may, with the permission of the Dean, arrange with the department in which he is taking his principal work to write a thesis which, if accepted, shall entitle him to not more than three hours of credit a term.

#### IV. MARKS

13. A, B, C, D are passing grades; E, represents a condition; F, a failure; Z, a course dropped without official cancellation.

14. No credit towards graduation will be given for a course in which a mark of E (condition) is recorded, unless the course be repeated and a passing mark received. A student who has received a mark of E (condition) in any course that is a prerequisite to another course may, at the discretion of the department concerned, be regarded as having satisfied the prerequisite; or the department concerned may, before regarding him as having satisfied the prerequisite, require him, by re-examination or otherwise, to remove the condition.

15. A student who, in any course, has received a term mark of "incomplete" or of "absent" may, with the consent of the Dean, and upon payment of the fee required by the University, be permitted to remove the mark, by examination or otherwise, as the department concerned may direct. A mark of incomplete or of absent may not be removed later than registration day of the third term of attendance in the University, dating from the time the course was taken in class, and no more than one attempt at removal will be allowed.

16. A student who has received a mark of E, of F, or of Z in any course, must re-register for it if he desires to secure credit for the course. (See paragraph 14 for E.)

#### BACHELOR OF ARTS WITH HONORS

The degree of Bachelor of Arts with Honors in the field of a student's upperclass group will be conferred upon those students who, in addition to having completed the requirements for the degree of

Bachelor of Arts, shall have (1) received a grade of B or better in at least half of the courses for which they have been enrolled; (2) passed with distinction a thorough comprehensive examination in the field of study in which their upperclass group requirement was satisfied; (3) been recommended for the said degree by the department or departments in which their work for the upperclass group was done.

### THE DEGREE OF BACHELOR OF CHEMISTRY

The degree of Bachelor of Chemistry will be awarded to those who have satisfactorily completed either of the following curricula, and the requirements prescribed by the University in Hygiene and Preventive Medicine and in Military Drill or in Physical Training. The completion of Curriculum No. 2, or its substantial equivalent, is required for admission to the fifth year of study leading to the degree of Chemical Engineer (see page 20). Since the first two years of work are identical in the two curricula, the student is afforded ample time to discover whether his interests lie chiefly in the field of pure chemistry or in the field of chemical engineering before he is compelled to decide upon his further course of study.

#### CURRICULUM NO. 1

##### FIRST YEAR

	<i>Course</i>	<i>First Term</i>	<i>Second Term</i>
Introductory Inorganic Chemistry . . . . .	Chemistry 101	3	—
Inorganic Chemistry Laboratory . . . . .	Chemistry 105	3	—
Introductory Qualitative Analysis . . . . .	Chemistry 205	—	3
Qualitative Analysis Laboratory . . . . .	Chemistry 206	—	3
Analytic Geometry and Calculus . . . . .	Mathematics 5a, 7	5	5
Introductory Experimental Physics . . . . .	Physics 3, 4	3	3
English . . . . .	English 1	3	3
		<hr/> 17	<hr/> 17

##### SECOND YEAR

Introductory Organic Chemistry . . . . .	Chemistry 305	3	3
Organic Chemistry Laboratory . . . . .	Chemistry 310	3	3
Introductory Quantitative Analysis . . . . .	Chemistry 220	3	—
Quantitative Analysis Laboratory . . . . .	Chemistry 221	3	—
Introductory Chemical Spectroscopy . . . . .	Chemistry 505	—	3
Gas and Fuel Analysis . . . . .	Chemistry 250	—	4
General Physics . . . . .	Physics 31, 32	2	2
Physical Measurements . . . . .	Physics 34	2	2
Drawing . . . . .	Engineering 125	3	—
		<hr/> 19	<hr/> 17

##### THIRD YEAR

Introductory Physical Chemistry . . . . .	Chemistry 405	3	3
Physical Chemistry Laboratory . . . . .	Chemistry 410	3	3
Advanced Inorganic Chemistry . . . . .	Chemistry 130	3	3
Introductory Chemical Microscopy . . . . .	Chemistry 530	3	—
Advanced Quantitative Analysis . . . . .	Chemistry 230	—	4
Elementary Mineralogy . . . . .	Geology 311	3	—
Introduction to Economics . . . . .	Economics 3	—	3
Elective . . . . .		<hr/> 3	<hr/> 3
		<hr/> 18	<hr/> 19

## FOURTH YEAR

Introductory Industrial Chemistry . . . . .	Chemistry	705	3	3
Seminary . . . . .	Chemistry	905	—	1
Research for Seniors . . . . .	Chemistry		4	4
Chemical Engineering . . . . .	Chemistry	710	—	4
Electrical Engineering . . . . .	Engineering	417	4	—
Elective . . . . .	(at least)		6	6
			17	18

## CURRICULUM NO. 2

(This curriculum is prerequisite to registration for the degree of Chemical Engineer.)

## FIRST YEAR

As in Curriculum No. 1

## SECOND YEAR

As in Curriculum No. 1

## THIRD YEAR

		<i>Course</i>	<i>First Term</i>	<i>Second Term</i>
Introductory Physical Chemistry . . . . .	Chemistry	405	3	3
Physical Chemistry Laboratory . . . . .	Chemistry	410	3	3
Advanced Quantitative Analysis . . . . .	Chemistry	230	4	—
Mechanics . . . . .	Mechanics	330	6	—
Mechanics . . . . .	Mechanics	331	—	5
Introductory Engineering Laboratory . . . . .	Engineering	103	1	—
Materials of Construction . . . . .	Engineering	360	2	2
Introduction to Economics . . . . .	Economics	3	—	3
Elementary Mineralogy . . . . .	Geology	311	—	3
			19	19

## FOURTH YEAR

Introductory Industrial Chemistry . . . . .	Chemistry	705	3	3
Industrial Organization . . . . .	Engineering	380	—	2
Heat Power Engineering . . . . .	Engineering	343	3	3
Mechanical Laboratory . . . . .	Engineering	368	3	—
Mechanical Laboratory . . . . .	Engineering	369	—	3
Advanced Inorganic Chemistry . . . . .	Chemistry	130	3	3
Introductory Chemical Microscopy . . . . .	Chemistry	530	3	—
Research . . . . .	Chemistry		4	4
			19	18

Candidates for the degree of Bachelor of Chemistry are required to take at least eight hours in research during the senior year in a division of the Department to be selected by the student. These divisions are: Inorganic Chemistry (Course 195); Analytical Chemistry (Course 295); Organic Chemistry (Course 395); Physical Chemistry (Course 495); Optical Chemistry (Course 595); Sanitary Chemistry (Course 695); Industrial Chemistry (Course 795); Agricultural Chemistry and Biochemistry (Course 895).

The elective courses required in the curriculum may be chosen by the student, in each case with the approval of the Department of Chemistry, from the advanced courses in Chemistry, or from certain courses in other departments of the College of Arts and Sciences, or in other colleges of the University.

Students in the Course in Chemistry may register for 20 hours a term. In order to register for more than 20 hours, the student must first obtain the consent of the Advisory Board for Underclassmen or the Committee on Academic Records.

## THE DEGREE OF CHEMICAL ENGINEER

A holder of the degree of Bachelor of Chemistry who has completed Curriculum No. 2, as given above, may obtain the degree of Chemical Engineer by completing a fifth year of study offered jointly by the College of Engineering and the Department of Chemistry of the College of Arts and Sciences. The curriculum for this fifth year leading to the degree of Chemical Engineer is as follows:

	<i>Course</i>	<i>First Term</i>	<i>Second Term</i>
Electrical Engineering Lectures.....Engineering	415	3	—
Electrical Engineering Lectures.....Engineering	416	—	3
Electrical Engineering Laboratory.....Engineering	435	2	—
Electrical Engineering Laboratory.....Engineering	436	—	2
Mechanical Engineering Laboratory.....Engineering	372	2	—
Chemical Engineering Laboratory.....Chemistry	710	—	4
Machine Design.....Engineering		3	—
Chemical Plant Design.....Chemistry	730	3	3
Electives.....		5	5
		18	17

The course of study leading to the degree of Chemical Engineer is intended primarily to prepare the graduate for technical work involving the development and supervision of the operation of industrial chemical processes and plants. It comprises instruction not only in the theoretical principles of chemistry and engineering, but also in the methods of applying these principles to the solution of the problems that arise in the industries.

## THE HONOR CODE IN EXAMINATIONS

Under a plan formulated by a joint committee of faculty and students, adopted by the Faculty of the College of Arts and Sciences, and approved by the University Faculty, a tribunal composed equally of faculty members and students, with the Dean as Chairman, has been set up to hear and dispose of cases of dishonesty and disorder in courses conducted by the College of Arts and Sciences. To this Honor Committee of the College of Arts and Sciences it is declared the duty of members of the faculty and of members of the student body to report observed cases of fraud and offences against good order. Every student of this College receives, at registration, a copy of the rules according to which it is expected that examinations and other academic exercises in Arts and Sciences will be conducted.

## COURSES OF INSTRUCTION

*The courses that are marked with the asterisk (\*) may not be counted for an upper-class group.*

### ASTRONOMY

**\*180. Introduction to Astronomy.** First term. Credit three hours. Professor BOOTHROYD and Mr. ROBERTS. Lectures and recitations: Section a, M W 10; Section b, M F 10; Section c, T Th 10; Section d, T S 10. *Lincoln* 31. Laboratory Section 1, M 2-4; Section m, T 2-4; Section n, Th 2-4; Section o, F 2-4. *Observatory*. Also observations at the Observatory three assigned evenings before Thanksgiving.

**181. The Solar System.** Second term. Credit three hours. Professor BOOTHROYD. Lectures and recitations: Section a, M W F 10; Section b, T Th S 10. *Lincoln* 31.

Courses 180 and 181 together satisfy the requirements of Group 4 in the College of Arts and Sciences. Course 180 gives a general idea of the science of astronomy, together with its history as illustrating the gradual development of the scientific method. Course 181 gives a more complete understanding of the solar system, together with an understanding of current methods of research.

**183. Astrophysics and Stellar Astronomy.** First term. Credit three hours. Professor BOOTHROYD. M W F 11. *Lincoln* 31. Prerequisites, Astronomy 181, Physics 3 and 4, and Mathematics 4b, or equivalents. An elementary exposition of spectroscopic, photometric, radiometric, and other methods as applied to the varied problems which sun, planets, comets, stars, nebulae and stellar systems present. Lectures, assigned readings, and discussions.

**184. Geodetic Astronomy.** First or second term. Credit three hours. Professor BOOTHROYD. Prerequisites, Mathematics 4b and Astronomy 180 or 181, or equivalents. A study of precise methods of determining time, latitude, longitude, and azimuth, together with practice at the *Observatory* in determining the instrumental constants and in making and reducing the observations. Chiefly laboratory practice with enough theory to give an understanding of the procedure. Hours to be arranged.

### GENERAL BIOLOGY

**\*A. General Biology.** Throughout the year. Credit three hours a term. Professor CLAASSEN, Mr. WOLF, and assistants. Lectures, M W 9 or 11, *East Roberts* 222. Laboratory, one period of two and one-half hours a week. *Roberts* 302.

Not open to students who have had college courses in zoology and botany. Students must report to the biology laboratory, *Roberts Hall* 302, at the time of registration, for assignment to laboratory section.

An elementary course designed for those who do not wish to specialize further in the biological sciences. The main ideas of biology shown through selected practical studies of the phenomena on which biological principles are based. Laboratory fee, \$3.50 a term.

### ANIMAL BIOLOGY

Enumeration of courses according to subject:

**General Zoology:** 1, 1a, 7, 8, 9, 11, 16, 17, 20, 21, 30, 75, 99.

**Entomology:** 3, 4, 5, 12, 31, 40.

**Histology and Embryology:** 101, 102, 103, 104, 115.

**Cytology:** 10

**Genetics:** 14

**Human Anatomy and Neurology:** 221, 222, 225, 226, 250.

**Physiology:** 302, 303, 305, 307, 308, 309, 310.

**Biochemistry:** 314, 314a, 316, 320.

**Taxonomy:** Insects, 6, 6a, 6b, 65; Vertebrates, 22, 23, 24, 25, 26, 67.

**Conservation:** 100.

**\*1. Introductory Zoology.** Throughout the year. Credit three hours a term. Professor REED, Miss MEKEEL, Miss McMULLEN, and Miss PHELPS. Lecture: Section I, T Th 9; Section II, T Th 11. Laboratory: M T W F 1:40-4; S 8-10:30. Lectures, *Goldwin Smith B.* Laboratory, *McGraw 2.*

A comprehensive view of the subject of Animal Biology, including the principles of structural and functional organization in the body, the animal as a living organism, the origin and perfection of types together with a consideration of zoological theory.

**\*1a. General Zoology.** Second term. Credit three hours. Assistant Professor YOUNG and Miss MEKEEL. Lecture, Th 10, *McGraw 5.* Laboratory for veterinary students, T Th 1:40-4; for others, W F 1:40-4, *McGraw 2.*

An introduction to the variety of animal life; biological principles illustrated with animal material; and the consideration of systematic relationships of the larger animal groups. Laboratory fee, \$4.50.

Primarily for students of Veterinary Medicine and those who begin their premedical course at midyear. Registration before instruction begins is required.

**3. General Entomology.** First term. Credit three hours. Prerequisite, Biology A, Animal Biology 1, or Botany 1. Professor HERRICK, Mr. HORSFALL, and Mr. BUTT. Lecture, W F 9; Laboratory, T W Th or F 1:40-4; or S 8-10:30. *Roberts 392.*

The characteristics of orders, sub-orders, and the more important families; the habits of representative species; the structure of insects; practice in their classification.

The lectures only (two hours) may be taken by those who have had Animal Biology 4 and 5. Laboratory fee, \$2.50.

Second term. Credit three hours. The life histories, habits, and control of injurious insects. Staff and hours as for the first term, except no laboratory section TS. Laboratory fee, \$2.

**4. Elementary Morphology of Insects.** Either term. Credit three hours. Professor JOHANNSEN and Mr. RICHARDS. By appointment. *Roberts 391.*

This course deals with the external and internal anatomy of several common species of insects. Required of all students who plan to take advanced work in entomology. Laboratory fee, \$2.

**5. Wing Venation and Evolution.** Either term. Credit one hour. Professor BRADLEY and Mr. PATE. Lecture, S 11, *Roberts 392*, and two additional hours during, T Th, or S mornings, by appointment, *Roberts 391.*

A laboratory study of evolutionary series as illustrated by progressive modification of the wings of insects. Required of all students who plan to take advanced work in entomology. Laboratory fee, \$1.50.

**6. Taxonomy of Insects.** Throughout the year. Credit three hours a term. Prerequisite, courses 4 and 5, and it will be helpful to have had courses 6a and 6b. Lecture, W 10, *Roberts 392.* Laboratory, W F 1:40-4. *Roberts 301.* Professor BRADLEY, Dr. FORBES, and Mr. PATE.

A survey of the classification of insects. The complete course occupies three consecutive terms, but the work of each may be taken independently. The orders treated will be: Fall of 1930, Coleoptera, Lepidoptera; Spring of 1931, Orthoptera, small orders, Diptera. Laboratory fee, \$4.50.

**6a, 6b. Elementary Taxonomy of Insects.** Second term. Credit one or two hours. Professor BRADLEY and Mr. PATE. Laboratory and field work, T Th 1:40-4.

(a) Elementary practice in the determination of the families and orders of insects. (b) After the Spring Recess: Methods of collecting insects and preserving them for study, and other matters of technique. Either part of this course may be taken independently. Credit one hour each. Courses 4 and 5 are prerequisite for the first part. For the second part there are no prerequisites. Laboratory fee, \$2.25 per credit hour.

**7. Biology of the Human Species.** First term. Credit one hour. Prerequisite, Biology A or the equivalent. Professor NEEDHAM. T Th 11. *Goldwin Smith A.*

The origin and development of man; the evolution of responsive life; the main phenomena of human inheritance; the effect upon population of the alteration of environment by the processes of civilization; the evolution of the social organism, and of social control.

**8. Elementary Taxonomy and Natural History of Vertebrates.** Throughout the year. Credit three hours a term. Professor WRIGHT and Mr. HAMILTON. Lecture, M 8; Laboratory, M W 1:40-4 or T Th 1:40-4. *McGraw 7*.

Lectures on fishes, amphibians, reptiles, birds and mammals, dealing with the principles of classification and nomenclature, characteristics, relationships, and bionomics of these groups. The laboratory gives practice in the identification of North American species. Field studies of the local fauna are undertaken during the fall and spring. Laboratory fee, \$4 a term.

Students completing this course may arrange under Animal Biology 99 to pursue advanced work in the taxonomy of Vertebrates.

**9. General Ornithology.** Second term. Credit three hours. Professor ALLEN and Mr. KELLOGG. Lecture, W 11. *McGraw 5*. Laboratory and field work M W 1:40-4 or T Th 1:40-4. *McGraw, South Museum*.

Introduction to the study of birds, particularly the local species. Laboratory work with bird skins is based on the field work. Laboratory fee, \$3.

Students completing this course may arrange, under course 99, to pursue advanced work during their junior and senior years.

**10. Cytology.** Second term. Credit four hours. Prerequisite, Botany 1 or Zoology 1. Lectures, T Th 9. Laboratory, T Th 10-12:30, or W F 10-12:30, or W F 8-10:30. Assignment to laboratory section must be made at time of registration. Small group conferences to be arranged. *Plant Industry 219*. Professor L. W. SHARP and Dr. MCCLINTOCK.

Intended for those who have had some biological training. The principal topics considered are protoplasm, cells and their components, nuclear and cell division, meiosis and fertilization, and the relation of these to the problems of development, reproduction, and heredity. Both plant and animal materials are used. Microtechnique is not included. Laboratory fee, \$5.

**11. Comparative Anatomy of Vertebrates.** Throughout the year. Credit three hours a term. Prerequisite, Animal Biology 1 or 1a. Professor REED, Mr. SENNING, Mr. HAZZARD, and Mr. HUNTER. Lecture, Section I, M 8, Section II, M 10. *McGraw 5*. Laboratory, W 1:40-4, S 8-10:30, M F 1:40-4; T Th 8-10:30; T Th 1:40-4. *McGraw 6*.

A thorough dissection and study of representative vertebrate types. The lectures deal with a comparative study of the structure of type forms so arranged as to supplement and connect the laboratory studies and emphasize the biological bearing of comparative anatomy.

**12. Insect Morphology.** Throughout the year. Credit two hours a term. Prerequisites, Animal Biology 4, and 3 or 6a. Professor JOHANNSEN. T Th 10. *Roberts 392*. This course deals with the anatomy, histology, physiology, and embryology of insects. Lectures, assigned readings, and reports.

Laboratory work in the technique of histological methods as applied to insect tissues may accompany or follow this course. Either term. Credit two hours. Two periods by appointment. *Roberts 391*. Laboratory fee, \$3.

**14. Genetics** (the same course as Plant Breeding 101). First term. Credit four hours. Prerequisite, Botany 1 and Plant Physiology, or Animal Biology 1 and either Animal or Human Physiology. Assistant Professor FRASER, Dr. DORSEY, and ————. Lectures, M W F 8, *Fernow 210*; Laboratory, M W or F 1:40-4. *Fernow 212*. One conference period to be arranged.

Courses in cytology and in taxonomic botany and zoology will be found helpful in connection with this course. Students must obtain assignment to sections at the time of registration. Laboratory fee, \$3.

**16. Invertebrate Zoology.** Throughout the year. Credit three hours a term. Assistant Professor YOUNG. Lecture, M 9, *McGraw 5*. Laboratory, M F 1:40-4, *McGraw 2*.

The structure, development, and relationships of, and the application of biological principles to, invertebrates. Whenever expedient, inland species are used as representatives of the various animal groups. Many forms are seen in their natural habitats. Laboratory fee, \$3.

Registration before instruction begins is necessary.

17. **Mammalian Anatomy.** First term. Credit three hours. Mr. SENNING. Laboratory, M W F 8-10:30.

This course is designed to provide a foundation in mammalian morphology.

Not open to students who are preparing for a medical course. No credit given to those who have had course 11.

20. **Animal Ecology.** First term. Credit three hours. Prerequisite, Zoology 1 or Biology A, and Entomology 3. Professor NEEDHAM and MRS. KLOTS. Th 9, Th 1:40-4, and one period by appointment. *Roberts* 392.

The lives of animals in relation to their environment; the relation between their structures and instincts and the situations in which they live. Laboratory fee, \$2.50.

21. **General Limnology.** Second term. Credit three hours. Prerequisite or parallel courses, Biology 1, or Animal Biology 1 and 3, or the equivalent. Professor NEEDHAM and MRS. KLOTS. Lecture, Th 9; Laboratory, Th 1:40-4, and one period by appointment. *Roberts* 392.

The life of inland waters; aquatic organisms in their qualitative, quantitative, seasonal, and ecological relations. The course includes one all-day trip, taken on some Saturday in May. Laboratory fee, \$2.50.

[22. **Ichthyology, Advanced Systematic and Field Zoology.** Throughout the year. Credit three hours a term. Lectures T Th 8. *McGraw* 7. Laboratory F 1:40-4 or S 8-10:30. Professor WRIGHT and Mr. HAMILTON. Not given in 1930-31.]

[23. **Herpetology** (Amphibia). First term. Credit three hours. Professor WRIGHT and Mr. HAMILTON. Lectures T Th 8. *McGraw* 7. Laboratory, F 1:40-4 or S 8-10:30.

An amplification of the prerequisite course 8. In the lectures special emphasis will be laid on the principal phases of animal life; the taxonomy, origin, and evolution of fossil and living groups; geographical distribution; and the literature and institutions of zoology. Laboratory periods will be devoted to the identification of exotic and indigenous forms. Not given in 1930-31.]

[24. **Herpetology** (Reptilia). Second term. Credit three hours. See Announcement for course 23. Professor WRIGHT and Mr. HAMILTON. Not given in 1930-31.]

25. **Mammalogy.** Credit three hours a term. See Announcement for course 23. Professor WRIGHT and Mr. HAMILTON.

[26. **Advanced Ornithology.** First term. Credit three hours. Prerequisite Animal Biology 8 or 9. Professor ALLEN and Mr. KELLOGG. Lecture W 11, *McGraw, South Museum*. Laboratory and field work, T Th 1:40-4.

The classification of birds; geographical distribution; the literature and institutions of ornithology; identification of representative birds of the world. The first part of the term will be devoted to field work on the fall migration, and the identification of birds in winter plumage. Laboratory fee, \$3. Not given in 1930-31.]

30. **Parasites and Parasitism.** First term. Credit two hours. Prerequisite, Biology A, or Animal Biology 1. Professor MATHESON and Mr. WILSON. Lecture, T 9. *Roberts* 392; Laboratory, M or T 1:40-4 or T 10-12:30. *Roberts* 301.

The origin and biological significance of parasitism, and of the structure, life and economic relations of representative parasites. Laboratory fee, \$4.

31. **Medical Entomology.** Second term. Credit two hours. Prerequisite, Animal Biology 1 or Biology A. Professor MATHESON and Mr. WILSON. Lecture, T 9, *Roberts* 392. Laboratory, M or T 1:40-4 or T 10-12:30. *Roberts* 301.

Insects and other Arthropods which are the causative agents of disease in man and animals, or are the vectors or intermediate hosts of disease-producing organisms. Laboratory fee, \$4.



40. **Bees.** Second term. Credit three hours. Prerequisite, Animal Biology 3 or equivalent. Professor PHILLIPS. Lectures, T Th 9; laboratory, 1:40-4. *Roberts 292.*

Fundamentals of beekeeping; the life history, instincts, and general behavior of bees; their products; the sources of honey; the role of bees in cross-pollination; the equipment of the apiary; wintering problems; the diseases of bees; and the rearing of queens. Laboratory fee, \$2.50.

65. **The Technics of Biological Literature.** First term. Credit three hours. Professor BRADLEY. See Announcement of Graduate School.

67. **Seminary in Systematic Vertebrate Zoology.** First and second terms. Credit one hour a term. Life zone plans of North America, 1817-1920. Distribution and origin of life in North America. Zoogeography of the Old World. Animal coloration. Other topics to be announced. Hours to be arranged. Professor A. H. WRIGHT.

70. **Entomological Reading in Foreign Languages.** Throughout the year. Professor JOHANNSEN. See Announcement of Graduate School.

\*75. **Laboratory Methods.** Second term. Credit three hours. Prerequisite, major work in Biology. Admission only by consent of instructor. Professor CLAASSEN in charge. F 10-12:30 and 1:40-4 and one lecture period by appointment. Laboratory fee, \$4.

For seniors whose upperclass group is in the field of Biology, and for graduates who expect to teach or to follow some phase of zoology as a profession. This course includes such subjects as laboratory equipment; collecting, preservation, and storage of materials; rearing of cultures; modelling in wax; injection of blood vessels and embalming; chart making, and photography of animals including the preparation of lantern slides.

99. **Zoological Problems.** Throughout the year. Credit hours variable. Admission to the course is by consent of the instructor. The Animal Biology staff. By appointment.

For qualified seniors and juniors. Opportunity is afforded for the pursuit of special problems or special phases of zoological study beyond that permitted by the more formal courses. For research work see the Announcement of the Graduate School.

\*100. **Conservation of Wild Life.** First term. Credit two hours. Professors NEEDHAM, HOSMER, WIEGAND, WARREN, HERRICK, ADAMS, EMBODY, PALMER, WRIGHT, ALLEN, and CLAASSEN, Assistant Professor YOUNG. T Th 11. *McGraw 5.*

101. **The Tissues: Histology and Histogenesis.** First term. Credit four hours. Prerequisite, Animal Biology 1 or Biology A. Professor KINGSBURY and assistants. Lectures, T Th 11. *Stimson 8*; Laboratory, Section I, T Th 8-11; Section II, T Th 1:40-4. *Stimson 39.*

For students of biology or those preparing for medicine. The cell and cellular origin of the body, and the structure and development of its component tissues. Each student will prepare or receive a series of typical microscopic preparations.

102. **The Organs: Histology and Development.** Second term. Credit four hours. Prerequisite, Animal Biology 101 or its equivalent. Mr. SCUDDER and assistants. Lectures W F 10, *Stimson 8*; laboratory, W F 1:40-4. *Stimson 39.*

A continuation of course 101. Courses 101 and 102 together give the fundamental facts of the microscopic structure and development of the body.

103. **Special Histology and Histologic Technique.** First term. Credit three hours. Prerequisite, Animal Biology 101 or its equivalent. One lecture and two laboratory periods at hours to be arranged.

Detailed knowledge of histology and histological methods as gained by practical work in the analysis of structure. Professor KINGSBURY and assistant.

Laboratory work may be continued in the second term upon some special technical topic.

104. **Vertebrate Embryology.** Second term. Credit five hours. Prerequisite, Animal Biology 101 or its equivalent. Professor KINGSBURY and assistants.

Lectures, T Th 11 and lecture or conference, S 11, *Stimson* 8; laboratory, Section I, T Th 8-11; Section II, T Th 1:40-4, *Stimson* 39.

For students of biology or those who are preparing for the study of medicine. The course is designed to give the basis for understanding the development of the human body.

**115. Experimental Embryology.** Second term. Credit two hours. Assistant Professor ADELMANN. Primarily for graduates and specially qualified undergraduates. The course will be conducted as a seminar. Lectures with reports by students dealing with the experimental analysis of developmental processes. Hours to be arranged. *Stimson*.

**221. Structure of the Human Body.** Second term. Credit three hours. Prerequisite, Animal Biology 1 or 303 or other equivalent biological courses. Professor KERR. Lectures, M W F 8; one demonstration at an hour to be arranged. *Anatomy Amphitheater. Stimson* 49.

For students in the biological sciences and for others wishing to obtain a knowledge of the structure of their own bodies. Normal structures of the body, together with its variations and evolution based on development in the individual and the race. Illustrated by specimens, lantern slides, and diagrams.

**222. Anatomical Methods.** First term. Credit three hours. Prerequisite, Animal Biology 1. Previous work in Comparative Anatomy also is recommended. Assistant Professor PAPEZ and instructors. The laboratory is open any morning except Saturday. Lectures, *Stimson* 49; laboratory, *Stimson* 52.

One lecture and nine hours of laboratory a week are required.

**225. Comparative Neurology.** Second term. Credit three hours. Prerequisite, Animal Biology 1 and 11. Assistant Professor PAPEZ. M W F 8-10. *Stimson* 52.

A comparative study of the vertebrate nervous system based on dissections of brains of shark and cat, and sections of cat brain stem; the chief nerve mechanisms that determine the form and structure of the nervous systems, their evolutionary and functional significance. One recitation and two laboratory periods.

**[226. Cerebral Mechanisms.** Second term. M W F 8-10. Credit three hours. Prerequisite course 225. Assistant Professor PAPEZ.

A course of study of the cerebral cortex of lower mammals and the primates with special reference to the subcortical connections and functional significance of the various cortical areas of the human brain. Conference hour will be arranged later. Recommended for students in psychology and animal behavior, by consent of the instructor. Not given in 1930-31.]

**250. Advanced and Research Work in Human Anatomy and Neurology.** Throughout the year. Credit two or more hours a term. Professor KERR and Assistant Professor PAPEZ. Hours to be arranged. *Stimson* 52.

The laboratories are open to those who have taken the necessary preliminary courses and are otherwise qualified. Primarily for graduates and for undergraduates properly qualified.

**\*302. Introductory Physiology.** Throughout the year. Credit three hours a term. Professor LIDDELL. Lectures, T Th 9. Laboratory, Th 1:40-4. Prerequisites, Animal Biology 1 and an introductory course in Physics or Chemistry.

An analysis of the functional organization of the animal. The purpose of the course is to familiarize the student with the methods and point of view of physiology in the study of animal biology.

**\*303. Human Physiology.** Repeated in second term. Credit three hours. M W F 10. Assistant Professor DYE and instructor.

An introductory course for students of the biological sciences, for those who expect to teach physiology in the secondary schools, and for those who desire a general knowledge of the physiological processes as applied to the human body. This course is designed primarily for students who are already familiar with the first principles of biology and chemistry and who are in a position to understand the general physiological processes presented. Two lectures and one recitation a week.

**305. Physiology and Biophysics of Radiation.** Second term. Credit two hours. Open to graduate students and qualified seniors. Dr. MAUGHAN. M W 2-4. Discussions and demonstrations. *Stimson.*

**307. Experimental Analysis of Behavior.** First term. Credit two hours. Professor LIDDELL. Primarily for graduate students but others, properly qualified, may be admitted. Seminary, T Th 1:40-4.

**308. Advanced Work and Research in Physiology.** Throughout the year. Credit two or more hours. Prerequisite, previous courses in Physiology. Assistant Professor DYE. *Stimson* 31.

**309. Physiology of Respiration, Vital Dynamics, and the Circulation.** First term. Credit three hours. Lecture, day and hour to be arranged; laboratory, M W afternoons. Assistant Professor DYE. Open to upperclassmen who have completed course 302 or 303, or their equivalent, and who are otherwise qualified. *Stimson* 31.

A study of the physical and chemical processes of the cell, and of the body as an aggregate of cells; respiration; circulation; and muscular activity.

**310. Seminary in Physiology.** Second term. Credit one hour. For graduate students and others properly qualified. Hour to be arranged. Members of the staff. *Stimson* 4. Reports on recent advances in physiology.

**314. Elementary Biochemistry.** First term. Credit three hours. Prerequisite, Chemistry 375 or the equivalent. Professor SUMNER, Mr. KIRK, and Mr. HAND. Lectures, M W 12; conferences, F 12. *Stimson* 4.

The substances met with in living things, and the chief facts of digestion, metabolism, and nutrition. (Courses 314 and 314a will not be accepted for the requirements of biochemistry in the Medical College. Chemistry students are advised to take Biochemistry for Medical Students. See the Announcement of the Medical College.)

**314a. Laboratory Work in Biochemistry.** First term. Credit two hours. Prerequisite or parallel course, Animal Biology 314. Professor SUMNER, Mr. HAND, and Mr. KIRK. M W 1:40-4. *Stimson* 34.

**320. Advanced and Research Work in Biochemistry.** Throughout the year. Credit two or more hours. Prerequisite, Animal Biology 314 and 314a. Professor SUMNER. Hours to be arranged. *Stimson* 34.

For other courses in Biochemistry, see the Announcement of the Medical College.

## BOTANY

Students wishing instruction in special groups of plants or in special subjects should consult the department.

**\*1. General Botany.** Throughout the year. Credit three hours a term; both terms of the course must be completed to obtain credit, unless the student is excused by the department. Professor PETRY, Mr. LAUBENGAYER, Miss KOCH, Miss CREIGHTON, Mr. MAGUIRE, Mr. LINDSEY, and others. Lectures, T Th 9 or 11. *East Roberts* 222. Laboratory, one period of two and one-half hours. *Stone.* Assignment to sections must be made at the time of registration.

A survey of the fundamental facts and principles of plant life. The work of the first term deals with the structures and functions of the higher plants, with special emphasis on their nutrition. The work of the second term traces the evolution of the plant kingdom, as illustrated by representatives of the principal groups, and concludes with a brief introduction to the principles of classification of the flowering plants. Laboratory fee, \$3.50 a term.

**13. Trees and Shrubs.** First term. Credit three hours. Prerequisite, course 1 or its equivalent. Professor WIEGAND and Mr. ABBE. Lecture, T 8. *East Roberts* 222. Laboratory or field work, M W or T Th 1:40-4. One all-day field trip is required. *Stone*, Botanical Laboratory. Assignment to laboratory sections must be made at the time of registration.

The identification of trees and shrubs, in summer and in winter conditions. The laboratory work covering identification will be done largely in the field.

The work of the latter part of the term will be a study of the taxonomy of woody plants. For all students wishing a detailed knowledge of trees and shrubs. Laboratory fee, \$3; deposit, \$5.

**31. Plant Physiology.** First or second term. Credit four hours. Prerequisite, course 1. Professor KNUDSON, or Professor O. F. CURTIS, and Assistant Professor HOPKINS, and Mr. ———. Lectures, T Th 10. First term, *Caldwell* 143; second term, *Roberts* 292. Laboratory, T Th 1:40-4; or W F 1:40-4. *Stone* 21. Assignment to laboratory sections must be made at the time of registration.

This course is designed to acquaint the student with the general principles of plant physiology. Topics such as water relations, photosynthesis, translocation, digestion, respiration, mineral nutrition, growth, and reproduction are studied in detail; in both laboratory and recitations emphasis is placed on discussion of the principles taught and their applications. Laboratory fee, \$4; deposit, \$3.

**117. Taxonomy of the Higher Plants.** Second term. Credit four hours. Prerequisite, course 1 or its equivalent. Professor WIEGAND. Lecture, M 9. Laboratory, M W F 1:40-4. *Stone*, Botanical Laboratory.

A study of the kinds of seed plants and ferns, their classifications into genera, families, and orders, and field work on the local flora. Emphasis will be placed on wild plants, but the more common cultivated plants will receive some attention. The course is planned to follow course 1 and to furnish an introduction to the knowledge of the field botany and classification of the higher plants, in preparation for special work in various departments, and as an aid in teaching. Instruction will be given in the preparation of an herbarium and of keys. Laboratory fee, \$4; deposit, \$5.

Students completing this course may arrange, under course 145, to pursue special advanced work in taxonomy.

**[123. Plant Anatomy.** First term. Credit four hours. Prerequisite, course 1, or its equivalent, and permission to register. Lecture and conference, T 9. Laboratory, T 10-12:30; Th 9-11:30; S 9-11:30. *Stone* 203. Professor EAMES and Dr. JACKSON.

This course is designed to give a working acquaintance with the internal morphology of vascular plants, and emphasis is placed on practice in interpretation and determination of material. The course is planned primarily for students in applied fields of botany, such as pathology, pomology, or genetics. Students desiring a less detailed training in this subject should take course 126. Laboratory fee, \$5.00. Not given in 1930-31.]

**124. Cytology.** Second term. Credit four hours. Prerequisite, course 1 or Zoology 1 and preferably course 126. Professor L. W. SHARP and Dr. MCCLINTOCK. Lectures and conferences, T Th 9. Laboratory, T Th or W F 10-12:30, or W F 8-10:30. Assignment to laboratory section must be made at the time of registration. *Plant Industry* 219.

Intended for those who have had some biological training. The principal topics considered are protoplasm, cells and their components, nuclear and cell division, meiosis and fertilization, and the relation of these to the problems of development, reproduction, and heredity. Both plant and animal materials are used. Microtechnique is not included. Laboratory fee, \$5.

**126. Morphology of Vascular Plants.** First term. Credit four hours. Professor EAMES and Dr. JACKSON. Prerequisite, course 1 or its equivalent. Lectures, T Th 9; Laboratory, T Th 10-12:30. *Stone* 203.

An advanced course in the comparative morphology, life histories and phylogeny of vascular plants. Laboratory fee, \$5.

**Comparative Morphology of Fungi.** Given in the Department of Plant Pathology.

**[141. History of Botany.** Second term, without credit.

A course of lectures given by various members of the staff with the purpose of acquainting advanced students of botany with the historical development of their science. Not given in 1930-31.]

**145. Special Problems in General Botany, Taxonomy, Histology, Cytology, and Physiology.** Throughout the year. Credit not less than two hours a term.

By appointment. Professors WIEGAND, KNUDSON, EAMES, L. W. SHARP, O. F. CURTIS, and PETRY, and Assistant Professors MUENCHER and HOPKINS.

Students engaged in special problems or making special studies may register in this course. They must satisfy the instructor under whom the work is taken that their preparation warrants their choice of problem. The laboratory fee depends on the nature of the work and on the number of credit hours.

**219. Advanced Taxonomy of Vascular Plants.** Second term. Credit two hours. Prerequisite, course 117 or its equivalent. Professor WIEGAND. Hours to be arranged. *Stone.*

Special round-table discussion of topics of particular interest to the taxonomist. One hour is devoted to practical work on some group of plants.

**231. Plant Physiology.** Advanced Lecture Course. Throughout the year. Credit three hours a term. Prerequisite, training in botany and chemistry, to be determined in each case by the department. Recommended for seniors and graduate students. Professors KNUDSON and O. F. CURTIS. Lectures M W F 10. *Roberts 292.*

**232. Plant Physiology.** Advanced Laboratory Course. Throughout the year. Credit three hours a term. Prerequisite or parallel, course 231. Professors KNUDSON, O. F. CURTIS, and Assistant Professor HOPKINS. Laboratory, M 1:40-4:30, S 8-12:30. *Stone 21.* Laboratory fee, each term, \$10; breakage deposit, \$5.

**224. Seminary in Cytology.** First term. M 11. Professor L. W. SHARP.

**227. Seminary in Morphology.** Throughout the year. Professor EAMES. Hours to be arranged.

**233. Seminary in Plant Physiology.** Throughout the year. Required of graduate students taking work in the department. Professors KNUDSON, O. F. CURTIS, and Assistant Professor HOPKINS. Conference, F 11. *Stone.*

The presentation and discussion of current contributions to plant physiology; reports on the research problems of graduate students and members of the staff.

## CHEMISTRY

*All courses listed below are to be given in the Baker Laboratory of Chemistry.*

### INORGANIC CHEMISTRY

**\*101. Introductory Inorganic Chemistry.** Lectures. Repeated in the second term. Credit three hours.

Two sections: M W F 11; T Th S 11. *Main Lecture Room.* Professor BROWNE and Assistant Professor LAUBENGAYER.

*Entrance credit in chemistry does not carry with it University credit in Course 101 or 105. If a student entering the University from a preparatory school desires credit for these Courses, he must pass an examination set by the Department of Chemistry. This examination is held in Ithaca on the same day in September as the entrance examination. University credit in Courses 101 and 105 that is obtained by passing this examination does not carry with it entrance credit in Chemistry.*

*Examinations for those who were unavoidably absent from the final examination in Course 101 and 105 will be held at 2 p. m. on the day before instruction begins in the fall.*

**\*105. Introductory Inorganic Chemistry.** Recitations and laboratory practice. Repeated in the second term. Credit three hours.

Recitations, one hour a week, to be arranged.

Laboratory sections: M F 1:40-4; T Th 1:40-4; W 1:40-4; S 8-10:30, (first term only). Room 150. Professor BROWNE, Assistant Professor LAUBENGAYER, and assistants.

Chemistry 101 and 105 must be taken simultaneously unless permission is obtained by the student from the Dean of his college and from the Department of Chemistry to take either course alone.

**130. Advanced Inorganic Chemistry.** Throughout the year. Credit three hours a term. Prerequisite or parallel courses, Chemistry 405 and 410. Professor DENNIS. M W F 11. *Baker 107.*

Lectures. The chemical elements are discussed in the order in which they occur in the Periodic Table of Mendeléeff, with special attention to the group properties of the elements and to the relations of the groups to one another. The rare elements and the rare earths are treated in as great detail as are the more common elements.

**135. Advanced Inorganic Chemistry.** Either term. Credit one to six hours. Prerequisite, Chemistry 305 and 310. Professors DENNIS and BROWNE and assistants. Day and hour to be arranged. *Baker 178 and 122.*

Laboratory practice. The preparation, purification, properties, and reactions of inorganic compounds including those of the rarer elements.

Chemistry 135 is designed to accompany Chemistry 130, but either course may be taken separately.

**[140. Selected Topics in Advanced Inorganic Chemistry.** Second term. Credit two hours. Prerequisite, Chemistry 405 and 410, or special permission. Professor BROWNE. W F 9. *Baker 107.* Not given in 1930-31.]

**150. The Chemistry of Glass.** Second term. Credit one hour. Assistant Professor LAUBENGAYER. M 9. *Baker 107.*

A discussion of the development and manufacture of glass and related ceramic ware, such as pottery and porcelain, with special emphasis on the relations between constitution and physical and chemical properties. Inspection trips to nearby ceramic plants will be arranged.

**195. Research for Seniors.** Throughout the year. Professors DENNIS and BROWNE and Assistant Professor LAUBENGAYER.

#### ANALYTICAL CHEMISTRY

**205. Introductory Qualitative Analysis.** Repeated in the second term. Credit three hours. Prerequisite, Chemistry 101 and 105. Must be taken with Course 206. Assistant Professor NICHOLS and assistants.

Lectures: Assistant Professor NICHOLS, M W 9. *Baker 177.*

Recitations: one hour a week, to be arranged.

A study of the application of the theories of general chemistry, to the systematic separation and detection of the common elements and acid radicals.

Students in science are advised, and candidates for the degree of Bachelor of Chemistry are required, to take this course together with Course 206 instead of Course 210.

**206. Introductory Qualitative Analysis.** Repeated in the second term. Credit three hours. Prerequisite, Chemistry 101 and 105. Must be taken with Course 205. Mr. AVENS and assistants.

Laboratory section: M W F 1:40-4. *Baker 50.*

Laboratory practice. A study of the properties and reactions of the common elements and acid radicals; the qualitative analysis of a number of solutions and solid compounds.

Students in science are advised, and candidates for the degree of Bachelor of Chemistry are required, to take this course together with Course 205 instead of Course 210.

**\*210. Introductory Qualitative Analysis.** Shorter course. Repeated in the second term. Credit three hours. Prerequisite, Chemistry 101 and 105. Mr. AVENS and assistants.

Lecture: Mr. AVENS, T 12. *Baker 207.*

Laboratory sections: T Th 8-10:30; T Th 1:40-4. *Baker 50.*

The properties and reactions of the common elements and acids; their detection in various liquid and solid mixtures.

**215. Advanced Qualitative Analysis.** First term. Credit three hours. Prerequisite, Chemistry 220, 221, 305, and 310. Assistant Professor NICHOLS, Mr. AVENS, and assistants. Day and hour to be arranged. *Baker 50.*

Laboratory practice. Essentially a continuation of Course 206. The methods for separating and detecting a number of metals and acids not studied in Course 206, including many of the rare elements. The qualitative analysis of a number

of solutions, solid mixtures, natural and commercial products will be required. For graduates and advanced undergraduates.

**220. Introductory Quantitative Analysis.** Repeated in the second term. Credit three hours. Prerequisite, Chemistry 205 and 206. Must be taken with Course 221. Assistant Professor NICHOLS, Mr. FLOYD, and assistants.

Lectures: Assistant Professor NICHOLS. T Th 9. *Baker* 207.

Recitations: one hour a week, to be arranged.

A study of the fundamental principles of gravimetric and volumetric analysis with practice in stoichiometry.

Students in science are advised, and candidates for the degree of Bachelor of Chemistry are required, to take this course together with Course 221 instead of Course 225.

**221. Introductory Quantitative Analysis.** Repeated in the second term. Credit three hours. Prerequisite, Chemistry 205 and 206. Must be taken with Course 220. Mr. FLOYD and assistants.

Laboratory Sections: First term, M T W 1:40-4; T Th 10-12:30; Th 1:40-4. *Baker* 252.

Laboratory practice in the preparation and standardization of various volumetric solutions and the analysis of a variety of substances by volumetric and gravimetric methods.

Students in science are advised, and candidates for the degree of Bachelor of Chemistry are required, to take this course together with Course 220 instead of Course 225.

**\*225. Introductory Quantitative Analysis.** Shorter course. Repeated in the second term. Credit three hours. Prerequisite or parallel course, Chemistry 210. Mr. FLOYD and assistants.

Lecture: Mr. FLOYD. Th 12. *Baker* 207.

Laboratory sections: T Th 8-10:30; T Th 9-11:30; M W 1:40-4; T Th 1:40-4. *Baker* 252.

A study of the fundamental principles of gravimetric and volumetric analysis.

**230. Advanced Quantitative Analysis.** Repeated in the second term. Credit four hours. Prerequisite, Chemistry 220 and 221. Mr. FLOYD and assistants. Recitation: one hour a week, to be arranged.

Laboratory periods: first term, M T W 1:40-4; T Th 9-1; S 8-1; second term, M T W Th F 1:40-4; T Th S 8-1. *Baker* 277 and 294. Students will be assigned to a combination of laboratory periods that will total seven and one-half hours a week.

Gravimetric, volumetric, and electrolytic methods of analysis, and methods of combustion analysis; the calibration of weights and volumetric apparatus; analysis of iron and steel, alloys, silicates, etc.

**235. Advanced Quantitative Analysis.** Second term. Credit two hours. Prerequisite, first term of Chemistry 405. Assistant Professor NICHOLS. M W 12. *Baker* 207.

Lectures: Selected topics in advanced quantitative analysis.

**240. Electrochemical Analysis.** Repeated in the second term. Credit two hours. Prerequisite, Chemistry 230 and 405. Mr. FLOYD. Day and hour to be arranged. *Baker* 292.

Laboratory practice. The most approved electrochemical methods for the determination of silver, lead, copper, tin, nickel, cobalt, and zinc; practice in the analysis of alloys and ores.

**245. Assaying.** First term. Credit two hours. Prerequisite, Chemistry 225 (or 220 and 221), and, if possible, a course in mineralogy. Mr. FLOYD and assistants.

Lecture: Mr. FLOYD. M 9. *Baker* 202.

Laboratory sections: M 1:40-4; W 1:40-4. *Baker* B-91 and B-96.

Lectures on the theory and practice of scorification and crucible assay, and on the metallurgy of copper, lead, zinc, silver, and gold; laboratory practice in the assay of zinc, lead, copper, gold and silver ores, mattes, and bullion.

**250. Gas and Fuel Analysis.** Repeated in the second term. Credit four hours. Prerequisite, Chemistry 220 and 221. Dr. MORSE and assistants.

Lectures: Dr. MORSE. M W 10. *Baker 207.*

Laboratory sections: M T 1:40-4; W Th 1:40-4; T Th 10-12:30; S 8-1. *Baker 282.*

The complete analysis of coal gas, flue gas, and air; the determination of the heating power of gaseous, liquid, and solid fuels; the analysis of coal; standard methods of testing various petroleum and coal-tar products; the analysis of various substances by methods involving the use of different types of gas evolution apparatus. Problems are assigned which afford practice in the calculation and interpretation of results.

**255. Advanced Gas Analysis.** Either term. Credit two or more hours. Prerequisite, Chemistry 250. Dr. MORSE and assistants. Day and hour to be arranged. *Baker 282.*

Conferences and laboratory practice. The study of the important methods and special forms of apparatus used in scientific gas analysis.

**270. Special Methods of Quantitative Analysis.** Either term. Credit two, three, or four hours. Prerequisite, Chemistry 230 and 235. Assistant Professor NICHOLS and assistants. Day and hour to be arranged. *Baker 277.*

Laboratory practice in the application of special methods such as indirect analysis, conductivity, electrometric titrations, etc., to quantitative analysis, and the analysis of special steels, ores, slags, alloys, etc.

Within certain limits the work may be selected to suit the requirements of the individual student.

**295. Research for Seniors.** Throughout the year. Assistant Professor NICHOLS, Dr. MORSE, Mr. AVENS, and Mr. FLOYD.

#### ORGANIC CHEMISTRY

**305. Introductory Organic Chemistry.** Throughout the year. Credit three hours a term. Prerequisite, Chemistry 210 and 225 (or 205, 206, 220, and 221). Open to those who are taking Course 220. Assistant Professor J. R. JOHNSON and Mr. TALLMAN. M W F 9. *Baker 207.*

Lectures and written reviews. The more important compounds of carbon, their occurrence, methods of preparation, relations and uses; illustrated by experiments and material from the museum.

**310. Introductory Organic Chemistry.** Throughout the year. Credit three hours a term. Prerequisite or parallel course, Chemistry 305. Assistant Professor J. R. JOHNSON, Mr. TALLMAN, and assistants. Laboratory section, F 1:40-4; S 8-1. *Baker 250.*

Laboratory practice and oral reviews. The student prepares a large number of typical compounds of carbon and familiarizes himself with their properties, reactions, and relations.

**315. Advanced Organic Chemistry.** Throughout the year. Credit two hours a term. Prerequisite, Chemistry 305 and 310. Assistant Professor JOHNSON and Mr. TALLMAN. T Th 9. *Baker 177.*

Lectures. A presentation of important chapters of organic chemistry and a discussion of classical researches in this field.

Students may register for any term separately.

**320. Advanced Organic Chemistry.** Either term. Credit two to six hours a term. Prerequisite, Chemistry 305 and 310. Assistant Professor J. R. JOHNSON, Mr. TALLMAN, and assistants. Day and hour to be arranged. *Baker 208.*

Laboratory practice. An advanced course in the preparation of organic compounds. The original literature is consulted, and the student is required to repeat some extended and important piece of work, and to compare his results with those published.

**340. Methods of Organic Analysis.** Second term. Credit three to six hours. Prerequisite, Chemistry 305 and 310. Assistant Professor J. R. JOHNSON, Mr. TALLMAN, and assistants. Laboratory conference, W 1:40. *Baker 207.* Labora-



tory sections, W Th F, 1:40-4. *Baker 250.* Laboratory work based upon Kamm: "Qualitative Organic Analysis."

**375. Elementary Organic Chemistry.** First term. Lectures and written reviews only, four hours credit; with laboratory, five to six hours credit. Students who are preparing for the study of medicine should determine the entrance requirements in Organic Chemistry for the medical school they desire to enter. If more than six hours credit is required, the student should register in Chemistry 305 and 310. Students may obtain nine hours credit by taking Chemistry 305 throughout the year (six hours) and Chemistry 310 (three hours) during the first term. Prerequisite, Chemistry 101 and 105. Assistant Professor J. R. JOHNSON, Mr. TALLMAN, and assistants.

Lectures and written reviews, M W F S 12. *Baker, Main Lecture Room.* Laboratory sections (six hours credit), M W 1:40-4, *Baker 250*; Conference M 1:40, *Baker 207.* T Th 1:40-4, *Baker 250*; Conference T 1:40, *Baker 207.* Laboratory section (five hours credit), Th 1:40-4, *Baker 250.*

**395. Research for Seniors.** Throughout the year. Assistant Professor J. R. JOHNSON and Mr. TALLMAN.

### PHYSICAL CHEMISTRY

**405. Introductory Physical Chemistry.** Throughout the year. Credit three hours a term. Prerequisite, Chemistry 305 (or 375) and Physics 3 and 4, and 30. Professor BRIGGS. M W F 9. *Baker 7.*

Lectures. A systematic presentation of modern chemical theory in which special attention is paid to the following topics: Gases, liquids, and solids; the theory of solution; reaction velocity, catalysis, and chemical equilibrium; the Phase Rule; colloid chemistry; thermochemistry; and elementary electrochemistry. Problems in physical chemistry.

It is advisable, but not obligatory, that course 410 accompany this course.

**410. Introductory Physical Chemistry.** Throughout the year. Credit three hours a term. Prerequisite or parallel course, Chemistry 405. Professor BRIGGS and assistants. Laboratory sections: M T 1:40-4; S 8-1, *Baker 1.*

Laboratory practice. Qualitative and quantitative experiments illustrating the principles of physical chemistry and including practice in performing physico-chemical measurements. An important feature of this course is the presentation of detailed reports based upon data obtained in the laboratory.

**415. Advanced Physical Chemistry.** Throughout the year. Credit two hours a term. Prerequisite, Chemistry 405. Professor BANCROFT. T Th 11. *Baker 7.*

An exposition of the law of mass action in its application to chemical equilibrium and reaction velocities.

**430. Applied Colloid Chemistry.** Throughout the year. Credit two hours a term. Open to candidates for the degree of Bachelor of Chemistry if they have completed Chemistry 405, to others only by special permission. Professor BANCROFT. T Th 10. *Baker 7.*

Lectures. The theory of colloid chemistry and its application in the arts.

**450. Applied Electrochemistry.** Throughout the year. Credit two hours a term. Prerequisite, Chemistry 405. Professor BRIGGS. M W 12. *Baker 7.*

Lectures. The theory of electrolysis and electromotive force; electrolytic extraction and refining of metals; electrolytic manufacture of organic and inorganic compounds; theory and practice of storage cells; preparation of compounds in the electric furnace. Problems in electrochemistry.

**455. Applied Electrochemistry.** Throughout the year. Credit two hours a term. Prerequisite or parallel course, Chemistry 450. Professor BRIGGS and assistant. Day and hour to be arranged. *Baker 1-A.*

Laboratory practice. Qualitative and quantitative study of electrolysis; determination of electrical conductivity; potentiometric measurements; hydrogen ion concentration; determination of current and energy efficiencies in electrolytic and electrothermal work; electrolytic preparation of organic and inorganic

compounds; tests of storage cells; preparation of compounds in the electric furnace; measurement of furnace temperatures.

[460. **Theoretical Electrochemistry.** Throughout the year. Credit two hours a term. Prerequisite, Chemistry 405. Professor BANCROFT. T Th 11. *Baker* 7. Not given in 1930-31.]

465. **Advanced Physical Chemistry.** Either term. Credit variable, but not to exceed six hours a term. Prerequisite, determined in each case by the Professor in charge. Professors BANCROFT and BRIGGS and assistants. Hour and work to be arranged. *Baker* 94.

Laboratory practice. Students may elect in mass law, reaction velocity, or efficiency measurements with special reference to course 415; in photo-chemistry, photography, or colloid chemistry with special reference to course 430; in conductivity, or electrometric determinations with special reference to course 460; in electrolytic, or electric furnace products with special reference to course 450; in the application of physical chemical methods to organic chemistry.

495. **Research for Seniors.** Throughout the year. Professors BANCROFT and BRIGGS.

#### OPTICAL CHEMISTRY

505. **Introductory Chemical Spectroscopy.** Repeated in the second term. Credit three hours. Prerequisite, Chemistry 210 and 225 (or 205, 206, 220, and 221). Open to those who have completed or are taking Physics 30, or by special permission. Professor PAPISH and assistants.

Lectures and written reviews. T Th 9. *Baker* 377.

Laboratory sections: Hours to be arranged. *Baker* 396.

The construction and the use in chemical analysis of the spectroscope, polariscope, refractometer, colorimeter, and nephelometer. The laboratory instruction is devoted to the training of the student in the use of these instruments in the solving of chemical problems.

510. **Advanced Chemical Spectroscopy.** Either term. Credit two or more hours. Prerequisite, Chemistry 505. Professor PAPISH and assistants. Day and hour to be arranged. *Baker* 396.

Laboratory practice. The study of arc, spark, and absorption spectra and the application of spectroscopic methods to the identification of dyestuffs. Practice in one or more of the subjects mentioned may be selected by the student.

520. **Spectrographic Methods.** Either term. Credit one or more hours. Prerequisite, Chemistry 505. Professor PAPISH. Laboratory hours to be arranged. *Baker* 396. Conference, hour to be arranged.

Laboratory practice. The application of photographic methods to arc, spark, and absorption spectroscopy. Practice is also given in the application of ultra-violet spectroscopy in chemical analysis.

530. **Introductory Chemical Microscopy.** Repeated in the second term. Credit three hours. Prerequisite, Chemistry 210 and 225 (or 205, 206, 220, and 221) and Physics 30, or by special permission. Professor CHAMOT, Assistant Professor MASON, and assistants.

Lecture: M 10. *Baker* 377.

Laboratory sections: M T 1:40-4; T Th 9-11:30; Th F 1:40-4 (first term only). *Baker* 378.

Lectures and laboratory practice. The use of the microscope and its accessories; microscopic methods as applied to chemical and other scientific investigations; micrometry; the examination of crystalline compounds and industrial materials; recognition of textile and paper fibers, etc. The application of microscopic methods to quantitative analysis.

535. **Microscopic Qualitative Analysis (Inorganic).** Second term. Credit three or more hours. Prerequisite, Chemistry 530. Professor CHAMOT, Assistant Professor MASON, and assistants. Laboratory periods, to be arranged. *Baker* 378. Conference, T 9. *Baker* 384.

Laboratory practice in the examination and analysis of inorganic substances containing the more common elements with special reference to rapid qualitative methods and to the analysis of minute amounts of material.

[540. **Microscopic Qualitative Analysis (Organic).** First term. Credit two hours. Prerequisite, Chemistry 530. Professor CHAMOT, Assistant Professor MASON, and assistants. Day and hour to be arranged. *Baker* 378.

Laboratory practice. Organic qualitative microscopic reactions of common commercial organic compounds, vegetable alkaloids, "strong drugs," etc., with particular emphasis upon the analysis of minute quantities of material. Not given in 1930-31.]

545. **Microscopy of Commercial Alloys.** Second term. Credit two hours. Prerequisite, Chemistry 530 or special permission. Assistant Professor MASON and assistants. M T 1:40-4. *Baker* 384.

Laboratory practice and conferences. An introduction to the principles and methods involved in the macroscopic and microscopic examination of metals, alloys, and other metallurgical products; practice in the preparation of specimens for microscopic study; metallographic microscopes and their use.

This course may be extended to include other materials of construction.

[550. **Microscopy of Foods and Beverages.** First term. Credit two hours. Prerequisite, Chemistry 530. Professor CHAMOT, Assistant Professor MASON, and assistants. Laboratory hours to be arranged. *Baker* 378. Not given in 1930-31.]

560. **Advanced Chemical Microscopy.** Second term. Credit two hours. Hours to be arranged.

Conferences and demonstrations. Theory and applications of instruments, accessories and methods used in critical microscopy, ultra-microscopy, photomicrography, and other special fields. Typical applications of microscopic methods in research and industry.

565. **Special Methods in Chemical Microscopy.** Either term. Credit one or more hours. Prerequisite, special permission. Professor CHAMOT and Assistant Professor MASON. Day and hour to be arranged. *Baker* 378 and 382.

Laboratory practice may be elected in various fields such as photomicrography, ultra-microscopy, crystal studies, micro-manipulations, quantitative determinations, and the microscopy of industrial materials.

595. **Research for Seniors.** Throughout the year. Professor CHAMOT, Professor PAPISH, and Assistant Professor MASON.

#### SANITARY CHEMISTRY

605. **Introductory Sanitary Chemistry (Foods).** First term. Credit two hours. Prerequisite, Chemistry 305 (or 210, 225, and 375). Dr. BEDIENT. T Th 11. *Baker* 377.

Lectures. Chemistry of foods, beverages, and food accessories; special apparatus; adulteration and misbranding, sweeteners, preservatives, food colors, food poisonings, and methods for their detection. Relation of the chemical composition of materials used in the household to the public health. Garbage disposal.

It is advisable, but not obligatory, that Course 610 accompany this course.

610. **Introductory Sanitary Chemistry (Foods).** First term. Credit two hours. Prerequisite or parallel course, Chemistry 605. Dr. BEDIENT and assistant. Laboratory sections at hours to be arranged. *Baker* 352.

Laboratory practice. Laboratory exercises designed to illustrate the material presented in course 605. General and special methods of analysis of foods, beverages, and food accessories, with special reference to the detection of adulteration. The use of saccharimeters, refractometers, cryoscopes, muffle furnaces, vacuum ovens, etc.

615. **Introductory Sanitary Chemistry (Water).** Second term. Credit two hours. Prerequisite, Chemistry 305 (or 210, 225, and 375). Dr. BEDIENT. T Th 11. *Baker* 377.

Lectures. Pollution of water; physical, chemical, bacteriological, and microscopical examination of water for household and municipal purposes; introduction

to the methods of water purification, and water softening, and their control. Interpretation of analytical results and the preparation of sanitary surveys.

It is advisable, but not obligatory, that Course 620 accompany this course.

**620. Introductory Sanitary Chemistry (Water).** Second term. Credit two hours. Prerequisite or parallel course, Chemistry 615. Dr. BEDIENT and assistant. Laboratory sections at hours to be arranged. *Baker* 352.

Laboratory practice. Laboratory exercises designed to illustrate the material presented in Course 615.

**[630. Advanced Sanitary Chemistry (Water).** First term. Credit two hours. Prerequisite, Chemistry 615. Dr. BEDIENT.

Laboratory practice to accompany this course may be elected under Course 635. Not given in 1930-31.]

**635. Advanced Sanitary Chemistry.** Either term. Credit two or more hours. Prerequisite, to be determined in each case by the instructor in charge. Dr. BEDIENT and assistant. Day and hour to be arranged. *Baker* 352, 356, 358. Laboratory practice.

Students who have had adequate preparation may elect work in any branch of sanitary chemistry. Among others, work along the following lines may be taken:

The bacteriology of water.

Continuation of work offered in courses 610 or 620.

The control of water purification.

Water softening.

The work in many cases may be arranged to meet the need of the individual student.

**695. Research for Seniors.** Throughout the year. Dr. BEDIENT.

#### INDUSTRIAL CHEMISTRY

**705. Industrial Chemistry.** Throughout the year. Credit three hours a term. Prerequisite, Chemistry 405. Professor RHODES. M W F 10. *Baker* 177.

Lectures. A discussion of various typical processes of chemical manufacturing from the standpoint of: (a) available materials, their properties and limitations; (b) standard forms of apparatus used in chemical manufacturing; (c) properties and specifications of commercial chemicals; (d) computation of costs and profits in chemical manufacturing.

By special permission, candidates for the degree of Bachelor of Chemistry may be permitted to register for the second term of Course 705 in their junior year and to postpone a part of their elective hours until the senior year.

**710. Chemical Engineering.** Second term. Credit four hours. Prerequisite, Chemistry 405. Professor RHODES, Mr. LEWIS, and assistants. Day and hour to be arranged. *Baker* B-78.

Laboratory practice. The study in the laboratory, on a semi-plant scale, of the unit processes of chemical engineering, such as agitation, and mixing, filtration, fractional distillation, evaporation, drying, absorption of gases, and heat transfer.

**715. Selected Topics in Chemical Engineering.** Second term. Credit three hours. Prerequisite or parallel course, Chemistry 705. Professor RHODES. M W F 11. *Baker* 177.

Lectures. A discussion of special topics in industrial chemistry. The lectures in 1930-31 will deal with the theory and design of chemical plant equipment for distillation, evaporation, drying, etc.

**725. The Chemistry of Fuels.** First term. Credit three hours. Prerequisite or parallel course, Chemistry 705. Professor RHODES. M W F 11. *Baker* 177.

Lectures. The chemistry of coal, coke, petroleum, tars, and the fuel gases. Particular stress is laid upon the theoretical chemistry involved in the carbonization of coal, the gasification of coal, and the distillation and refining of petroleum and tar.

**730. Chemical Plant Design.** Throughout the year. Credit three hours a term. Prerequisite, Chemistry 705. Professor RHODES. Day and hour to be arranged.

Conferences and calculation periods. Practice in the calculation and design of chemical plant equipment.

**\*775. Engineering Chemistry.** Repeated in the second term. Credit two hours. Prerequisite, Chemistry 101. Not open to students who are candidates for the degree of Bachelor of Chemistry. Mr. LEWIS. M W 8. *Baker, Main Lecture Room.*

Lectures. Chemistry in its relations to engineering.

**776. Chemistry of Pulp and Paper.** Second term. Credit two hours. Prerequisite, Chemistry 775. Open to students in Forestry, to others only by special permission. Mr. LEWIS. T Th 10. *Baker 177.*

Lectures. The chemistry of the manufacture of pulp and paper.

**795. Research for Seniors.** Throughout the year. Professor RHODES and Mr. LEWIS.

#### AGRICULTURAL CHEMISTRY

*Students will not be allowed to register in courses in Agricultural Chemistry until after they have taken and passed Chemistry 101 and 105 or their equivalent.*

**[805. Introductory Agricultural Chemistry (Fertilizers, Insecticides, Soils).** First term. Credit two hours. Prerequisite, Chemistry 305 (or 375). Professor CAVANAUGH. T Th 11. *Baker 302.*

Lectures. The relation of chemistry to agriculture; an introduction to the study of plant growth, the composition and chemical properties of soils, fertilizers, amendments, insecticides, and fungicides. Not given in 1930-31.]

**810. Introductory Agricultural Chemistry.** First term. Credit three hours. Prerequisite, Chemistry 205 and 220 (or 210 and 225). Mr. LOVELACE. *Baker 350.*

Laboratory practice: day and hour to be arranged. Recitation: day and hour to be arranged. Practice in the methods used by the chemist in the control laboratories of the factory, of the Government, and of the Experiment Stations, where fertilizers, insecticides, fungicides, and soils are examined.

**815. Introductory Agricultural Chemistry (Foods and Feeds).** Second term. Credit two hours. Prerequisite, Chemistry 305 (or 375). Professor CAVANAUGH. T Th 11. *Baker 302.*

Lectures. Discussion of the sources, chemical composition, and properties of the principal foods and feeds such as cereals, fruits, animal products, and dairy products. Relation of methods of preservation and manufacture to the nutritive value of foods.

**820. Introductory Agricultural Chemistry.** Second term. Credit three hours. Prerequisite, Chemistry 205 and 220 (or 210 and 225). Professor CAVANAUGH and assistant. *Baker 350.*

Laboratory practice: day and hour to be arranged. Recitation: day and hour to be arranged. The methods of the Association of Official Agricultural Chemists are used in the examination and analysis of foods and feeding stuffs, such as milk and milk products, cereal products, canned vegetables, etc.

**\*825. Elementary Agricultural Chemistry.** Second term. Credit three hours. Prerequisite, Chemistry 101. Professor CAVANAUGH. M W F 12. *Baker 377.* Candidates for the degree of Bachelor of Chemistry may not receive credit for this course toward the degree.

Lectures. The relation of chemistry to agriculture, and an introduction to the study of the composition and chemical properties of plants, fertilizers, feed stuffs, insecticides, and fungicides.

**\*830. Elementary Chemistry of Food Products.** Second term. Credit two hours. Prerequisite, Chemistry 101. Professor CAVANAUGH. W F 10. *Baker 377.* Candidates for the degree of Bachelor of Chemistry may not receive credit for this course toward the degree.

Lectures. The chemical composition, physical and physiological properties, sources, and methods of manufacture of the principal food products.

835. **Advanced Agricultural Chemistry (Fertilizers, Insecticides, Soils).** Either term. Credit two or more hours. Prerequisite, Chemistry 810. Professor CAVANAUGH and Mr. ———. Day and hour to be arranged. *Baker* 350.

Laboratory practice. Advanced work in the chemistry of soils, fertilizers, plant composition, insecticides, or fungicides. Special topics may be selected.

840. **Advanced Agricultural Chemistry (Foods and Feeds).** Second term. Credit two or more hours. Prerequisite, Chemistry 820. Professor CAVANAUGH. Day and hour to be arranged. *Baker* 350.

Laboratory practice. Special topics in the chemistry of foods and food preparations.

895. **Research for Seniors.** Second term. Professor CAVANAUGH.

#### SEMINARY

905. **Seminary.** Credit one hour. M 5. *Baker* 107.

For seniors who are candidates for the degree of Bachelor of Chemistry.

1000. **Non-Resident Lectures on the George Fisher Baker Foundation.** Credit two hours. T Th 12. *Baker* 107. Open to seniors in the course in Chemistry, and to juniors on special permission.

First term. (a) Chemical Analysis by X-rays and its Application. (b) Rare Earth Elements and Atomic Structure. (c) Chemistry of Hafnium. (d) Electrolytic Conduction in Atoms and Crystals. (e) Separation of Isotopes. Professor G. HEVESY, University of Freiburg in Baden, Germany.

Second term. Molecular Structure and the Periodic Classification. Doctor N. V. SIDGWICK, Lincoln College, Oxford, England.

#### THE CLASSICS

##### ARCHAEOLOGY, GREEK ART AND ANTIQUITIES

1. **History of Greek Sculpture.** Repeated in second term. Credit three hours. Professor ANDREWS. First term, M W F 10; second term, M W F 11. *Goldwin Smith Museum of Casts.*

Intended to be supplemented by course 3, but may be taken separately.

3. **Greek Antiquities.** Repeated in second term. Credit three hours. Professor ANDREWS. First term, M W F 11; second term, M W F 10; *Goldwin Smith Museum of Casts.*

Pre-Greek art and civilization; Greek terra cottas, bronzes, pottery, and gems. Illustrated by the material in the Museum of Casts and by stereopticon views. Intended to be taken with course 1, but may be taken separately.

4a. **Greek Coins.** First term. Credit two hours. Professor ANDREWS. T Th 11. *Goldwin Smith Museum of Casts.*

4b. **Greek Architecture.** Second term. Credit two hours. Professor ANDREWS. T Th 11. *Goldwin Smith Museum of Casts.*

6. **Greek Epigraphy.** Credit two hours. Prerequisite, facility in reading Greek. Professor ANDREWS. Hours to be arranged after consultation. *Goldwin Smith* 35.

A study of Greek alphabets and inscriptions, chiefly from the large collection of squeezes owned by the department. For graduates and qualified undergraduates,

#### GREEK

\*1a. **Greek for Beginners: Introduction to Homer's Iliad.** Repeated in second term. Credit three hours. First term: Professor CAPLAN. M W F 12. *Goldwin Smith* 124. Second term: Section 1, Professor CAPLAN. M W F 12. *Goldwin Smith* 124; Section 2, T Th S 10. Dr. CHERNISS. *Goldwin Smith* 124.

\*1b. **Homer's Iliad.** Continuation of Greek 1a. Repeated in second term. Credit three hours. Prerequisite, Greek 1a. First term: Dr. CHERNISS. T Th S 10. *Goldwin Smith* 120. Second term: Dr. CHERNISS. M W F 12. *Goldwin Smith* 120.

\*2a. **Attic Greek: Plato, Selected Dialogues.** Repeated in the second term. Credit three hours. Prerequisite, Greek 1b. First term, Assistant Professor McDONALD. T Th S 10. *Goldwin Smith* 120. Second term, Assistant Professor McDONALD. T Th S 10. *Goldwin Smith* 120.

\*2b. **Euripides, Iphigenia in Tauris: Lucian.** Repeated in the second term. Credit three hours. Prerequisite, Greek 2a. First term: Assistant Professor McDONALD. T Th S 11. *Goldwin Smith* 128. Second term: Professor JONES. T Th S 11. *Goldwin Smith* 128.

4. **Greek Composition.** Throughout the year. Credit one hour. Prerequisite, Greek 1b or its equivalent. Dr. CHERNISS. Hour to be arranged.

7. **Myths of the Epic Cycle.** First term. Credit two hours. Professor JONES. Open to sophomores and upperclassmen who have studied or are studying Freshman Latin or Greek and to graduate students. T Th 10. *Goldwin Smith* 120.

17. **Aristophanes, Clouds; Sophocles, Oedipus Rex, Antigone.** Throughout the year. Credit three hours a term. Prerequisite, Greek 2b. Professor JONES. M W F 11. *Goldwin Smith* 120.

20. **Lyric Poetry; Aeschylus, Prometheus Vincetus; Theocritus; Demosthenes, De Corona.** Throughout the year. Credit three hours a term. Prerequisite, Greek 17. Assistant Professor McDONALD. M W F 10. *Goldwin Smith* 120.

[25. **Advanced Greek Composition.** Throughout the year. Credit one hour a term. Prerequisite, Greek 4. Not given in 1930-31.]

30. **Lectures on Greek Literature: The Hellenistic Period.** First term. Credit two hours. Assistant Professor McDONALD. T Th 11. *Goldwin Smith* 120.

Open to those who have taken or are taking Greek 1b. Other students will be admitted by permission of the instructor.

[31. **Lectures on Greek Literature: Lyric and Didactic Poetry: The Epyllion and Pastoral.** First term. Credit two hours. Not given in 1930-31.]

33. **Classical and Mediaeval Rhetoric.** Second term. Credit three hours. Admission by consent of instructor; not open to underclassmen. Professor CAPLAN. Hours to be arranged. *Goldwin Smith* 121.

35. **The Republic of Plato.** Throughout the year. Credit three hours a term. Mr. ROBINSON. See Philosophy 27.

[40. **Greek Seminary: Homeric Geography.** Throughout the year. For graduates only. Professor JONES. Not given in 1930-31.]

41. **Greek Seminary: Aeschylus.** Throughout the year. For graduates only. Professor JONES. Th 2:30. *Library, Classical Seminary Room.*

**English Translations of Greek and Latin Classics.** Professor COOPER. See Comparative Study of Literature, Course 2.

**Methods of Literary and Linguistic Study.** Professor COOPER. See Comparative Study of Literature, Course 6.

**Greek History.** Professor LAISTNER. See History, Course 6.

#### LATIN

\*1a. **Freshman Course: For Students Offering Three Units of Entrance Latin.** Throughout the year. Credit three hours a term. Section 1, Dr. CHERNISS. M W F 9. *Goldwin Smith* 120; Section 2, Professor CAPLAN. M W F 10. *Goldwin Smith* 124.

Ovid; Virgil; Horace, Odes and Epodes.

\*1. **Freshman Course: For Students Offering Four Units of Entrance Latin.** Throughout the year. Credit three hours a term. Section 1, First term: Dr. CHERNISS; second term: Professor DURHAM. M W F 10. *Goldwin Smith* 128; Section 2, Assistant Professor HUTTON. M W F 11. *Goldwin Smith* 124.

Cicero, De Senectute; Martial, Epigrams; Horace, Odes and Epodes.

\*2. **Sight Translation.** Throughout the year. Credit one hour a term. Dr. CHERNISS. Th 12. *Goldwin Smith* 120.

Especially recommended as collateral work for those who are taking Course 1 or 1a, but open to all students. Courses 2 and 3 are given in alternate years.

[\*3. **Sight Translation.** Throughout the year. Credit one hour a term. Not given in 1930-31.]

[7. **Classic Myths in English Literature.** First term. Credit two hours. Professor DURHAM. Not given in 1930-31.]

\*8. **Terence; Horace, Satires and Epistles: Tacitus, Agricola; Catullus; Livy; Seneca, Epistles; Martial.** Throughout the year. Credit three hours a term. Prerequisite, Latin 1 or 1a. Assistant Professor HUTTON. T Th S 9. *Goldwin Smith* 128.

These works are divided into two groups given in alternate years.

11. **Survey of Roman Poetry**, with interpretation of representative selections. First term. Credit two hours. Open to those who have taken or are taking Course 8 or Course 16. Professor DURHAM. T Th 12. *Goldwin Smith* 128.

[12. **Virgil: Epic Poetry: Ennius; Georgics, The Last Six Books of The Aeneid; Lucan, Pharsalia.** Throughout the year. Credit two hours a term. Prerequisite, Latin 1 or 1a. Professor DURHAM. Not given in 1930-31.]

16. **The Greater Republican Writers.** Throughout the year. Credit three hours a term. Prerequisites, Latin 8, 11, or 12. (a) Plautus; (b) Cicero; (c) Lucretius. Professor CAPLAN. M W F 9. *Goldwin Smith* 124.

[17. **Literature and History of the Early Empire.** Throughout the year. Credit three hours a term. Prerequisites, Latin 8, 11, or 12. Tacitus, Annals; Juvenal; Pliny's Letters; Suetonius. Not given in 1930-31.]

21. **Latin Writing, Elementary Course.** Throughout the year. Credit one hour a term. Prerequisite, Latin 1 or 1a. Assistant Professor McDONALD. F 12. *Goldwin Smith* —.

26. **Teacher's Training Course.** First term. Credit two hours. This course along with Education 4 and 4a will satisfy the requirement in Methods of the N. Y. State Provisional Professional Certificate. Professor DURHAM. W F 12. *Goldwin Smith* 128.

Second term: **Vulgar Latin: Petronius, Cena Trimalchionis; Vulgar Latin Inscriptions, including Christian Inscriptions.** Credit two hours. Professor DURHAM. M W 12. *Goldwin Smith* 128.

[27. **Topography and Architectural Remains of Rome.** First term. Credit two hours. Not given in 1930-31.]

[30. **Lectures on Roman Literature: The Republican Period.** First term. Credit two hours. Professor DURHAM. Not given in 1930-31.]

31. **Lectures on Roman Literature: Roman Satire.** Second term. Credit two hours. Assistant Professor McDONALD. T Th 11. *Goldwin Smith* 124.

Open to those who have taken or are taking Latin 8, 11, or 12. Other students will be admitted by permission of the instructor.

33. **Classical and Mediaeval Rhetoric.** Second term. Credit two hours. Admission by consent of the instructor; not open to underclassmen. Professor CAPLAN. Hours to be arranged. *Goldwin Smith* 121.

39. **Latin Seminary: The MS Tradition of Cicero's Oratorical Works.** Throughout the year. For graduates only. Professor DURHAM. T 2:30. *Library, Classical Seminary Room.*

[40. **Latin Seminary: Horace.** Throughout the year. For graduates only. Professor CAPLAN. Not given in 1930-31.]

[41. **Latin Seminary: Plautus.** Throughout the year. For graduates only. Professor CAPLAN. Not given in 1930-31.]

45. **Latin Writing, Advanced Course.** Second term only. Credit one hour. Assistant Professor McDONALD. M 2. *Goldwin Smith* 124. For graduates and for undergraduates who have taken Latin 21.

[47. **Historical Latin Syntax.** Second term. For graduates only. Professor DURHAM. Not given in 1930-31.]



48. **Vulgar Latin: Petronius, Cena Trimalchionis; Vulgar Latin Inscriptions, including Christian Inscriptions.** Second term. Credit two hours. Professor DURHAM. W F 12. *Goldwin Smith* 128.

[49. **Indo-European Philology; Sounds and Flexions of Latin; Italic Dialects.** First term. Credit two hours. Professor DURHAM. Primarily for graduate students. Not given in 1930-31.]

[50. **Latin Epigraphy.** Throughout the year. Credit two hours. Not given in 1930-31.]

**Roman History.** Professor LAISTNER. See History, Courses 4 and 6.

## COMPARATIVE STUDY OF LITERATURE

1. **Modern Writers on Art: Ruskin, Tolstoy, and Nietzsche.** Throughout the year. Credit three hours a term. Open to sophomores and upperclassmen with the permission of the instructor. Assistant Professor HUTTON. M W F 11. *Goldwin Smith* 236.

A study of artistic principles and practice, with special attention to the art of prose.

2. **English Translations of Greek and Latin Classics.** Throughout the year. Credit three hours a term. Open to sophomores and upperclassmen. Professor COOPER. T Th 10-12, and an hour to be arranged. *Goldwin Smith* 236.

Rapid reading in the best translations, with emphasis upon Greek masterpieces; for example, the Iliad and the Odyssey, the tragedies of Sophocles, and several dialogues of Plato. Translations from the Latin will be chosen for the bearing of the original works upon modern literature. Students wishing to take the course must consult the instructor in advance.

3. **Old and Middle English.** Throughout the year. Credit three hours a term. Open to sophomores and upperclassmen, and to graduate students by special permission. Professor COOPER. M W F 10. *Goldwin Smith* 236.

A study of the foundations of the English language and literature, with emphasis upon literary aspects so far as a proper acquisition of linguistic knowledge shall permit. The work of the second term deals partly with Chaucer. Students may be admitted at the beginning of either term after consultation with the instructor.

The course will be of service to prospective teachers in the secondary schools.

4. **Principles of Literary Criticism.** Throughout the year. Credit three hours a term. Primarily for graduate students; open to upperclassmen by permission. Professor COOPER. W 11-12:50. *English Seminary Room.*

A study of the chief theories of poetry, and chief kinds of literature, with illustrations drawn from writers both ancient and modern.

This and the following courses are mainly designed for prospective college and university teachers.

[5. **Dante in English.** Throughout the year. Credit three hours a term. Primarily for graduate students; open to upperclassmen by permission. Professor COOPER. Not given in 1930-31.]

6. **Methods of Literary and Linguistic Study.** Throughout the year. Credit three hours a term. Open to graduate students only. Professor COOPER. M 11-12:50. *English Seminary Room.*

Reading in the *Encyklopädie* of August Boeckh, followed by a study of more recent treatises with special reference to the ancient classics and English.

7. **Chaucer Seminary.** Throughout the year. For graduate students only. Professor COOPER. Tuesday 7:30 p. m. *English Seminary Room.*

A survey of books and topics that are essential to the study of Chaucer and his age; systematic reading of his works; a detailed examination of significant problems.

## ECONOMICS

*Course 1 or its equivalent must be completed before any credit may be obtained toward the upperclass requirement.*

*To satisfy the upperclass requirement in Economics a student must complete (1) Course 1 or its equivalent; (2) a minimum of five hours in each of three groups other than the introductory group; (3) twenty hours in Economics, completed after attaining upperclass status.*

*A student who is excused from ten of the required twenty hours in an upperclass group must complete (1) course 1 or its equivalent; (2) a minimum of five hours in each of two groups, or three hours in each of three groups other than the introductory group; (3) ten hours in Economics completed after attaining upperclass status.*

*Certain courses in Agricultural Economics may be counted in partial fulfillment of the major requirement in Economics, but in no case may more than six of the required twenty hours be allowed for such courses; and, in each case, the specific approval of the adviser must be obtained before credit for such courses may be counted toward the upperclass requirement. Students must secure the approval of their adviser, and the permission of the Dean and of the instructor in charge of the course, before they may register for courses given outside the College.*

*The attention of students intending to elect Economics as their upperclass group is directed to the following courses in Government, History, and Philosophy. History of Political Thought; English History; American History; Economic History of the United States, History of Modern Europe, The Intellectual History of Modern Times; Problems of Philosophy, History of Philosophy, Social and Political Ethics.*

## INTRODUCTORY COURSES

**\*1. Modern Economic Society.** Repeated in second term. Credit five hours. Professor SLICHTER. Daily except S 8, 9, 10, 11, 12.

A survey of the existing economic order, its more salient and basic characteristics, and its operation.

In the first term, the enrollment will be limited. Students should register, if possible, on the first day of registration. Assignment to sections will be made on registration days at *Goldwin Smith 260*.

**\*2a. Modern Economic Society.** First term. Credit three hours. Professor SLICHTER. M W F 8, 9, 11; T Th S 8, 9, 11.

This course and course 2b cover the same subject matter as course 1.

Enrollment will be limited. Students should register, if possible, on the first day of registration. Assignment to sections will be made on registration days in *Goldwin Smith 260*.

**\*2b. Modern Economic Society.** Second term. Credit three hours. Pre-requisite course 2a. Professor SLICHTER. M W F 8, 9, 11; T Th S 8, 9, 11.

**\*3. Introduction to Economics.** For students in Engineering and Chemistry. Repeated in second term. Credit three hours. Professor SLICHTER. Hours to be announced.

An introduction to the more essential outlines of contemporary economic organization and to a number of economic problems about which a citizen in American society is required to formulate or express his opinions.

**\*5. Current Economic Problems.** Second term. Credit three hours. Pre-requisite, Economics 1 or its equivalent. Professor SLICHTER. M W F 9, 11; T Th S 8.

A continuation of Course 1 or 2, designed to afford students an opportunity to become acquainted in a general way with the more important economic problems of the day—tariff problems, reparations problems, railroad problems, trust problems, labor problems, problems of the farmer, conservation problems, and problems of taxation and public finance.

## FINANCE

**11. Money and Banking.** Repeated in second term. Credit three hours. Prerequisite, Economics I or its equivalent. Professor REED. M W F 10. *Goldwin Smith 142.*

A study of the history and the theory of money and banking.

Enrollment limited to seventy-five students.

**12. Financial History of the United States.** Second term. Credit three hours. Prerequisite, Economics 11. Assistant Professor O'LEARY. T Th S 10. *Goldwin Smith 256.*

A survey of developing financial institutions, problems, and legislation from 1700 to 1900. Monetary, banking, and public finance problems will be dealt with against the changing background of American economic organization.

**13. Corporation and Investment Finance.** First term. Credit three hours. Prerequisite, Economics 11 and 21a. Assistant Professor O'LEARY. M W F 9. *Goldwin Smith 142.*

A study of the financial problems of the business corporation from the points of view of the management and of the investor.

**14. The Federal Reserve System.** Second term. Credit three hours. Prerequisite, Economics 11. For seniors majoring in Economics, and graduate students. Professor REED. M W F 11. *Goldwin Smith 264.*

**15. Trade Fluctuations.** First term. Credit three hours. Prerequisite, Economics 11. For seniors majoring in Economics, and graduate students. Professor REED. M W F 11. *Goldwin Smith 242.*

A study of the causes and effects of trade recessions and revivals, with an introduction to the methods of general forecasting.

**16. Money and Credit.** Throughout the year. For graduate students only. Professor REED. Hours to be arranged.

A discussion of some of the more intricate phases of monetary and banking theory.

## ACCOUNTING

**21a. Accounting.** Repeated in second term. Credit three hours. Prerequisite, Economics I or its equivalent. Professor ENGLISH. First term, M W F 8, *Goldwin Smith 142*; second term, T Th S 8, *Goldwin Smith 142*. One practice period a week, *Goldwin Smith 329.*

Theory of debit and credit; the journal and ledger; the development of books of original entry; analysis of income sheets and balance sheets.

**21b. Accounting.** Repeated in second term. Credit three hours. Prerequisite, Economics 21a. Professor ENGLISH. First term, T Th S 8, *Goldwin Smith 256*; second term, M W F 8, *Goldwin Smith 256*. One practice period a week. *Goldwin Smith 329.*

The issue and transfer of capital stock, bonds and their valuation, depreciation, reserves and reserve funds, sinking funds, analysis of income sheets and balance sheets.

**[25. Cost Accounting.** First term. Credit two hours. Prerequisite, Economics 21b. Professor ENGLISH. Th 2-4. *Goldwin Smith 329.* Not given in 1930-31.]

The purpose and methods of determining manufacturing costs.

**26. Accounting Theory and Problems.** Second term. Credit three hours. Prerequisite, Economics 21b, or its equivalent. Professor ENGLISH. M W F 9. *Goldwin Smith 256.*

A critical study of the fundamental principles underlying accounting procedure. The solution of typical problems in corporate consolidation, reorganization, and liquidation, and in other special fields.

The attention of students is called to the following related work: Introduction to the Mathematics of Finance, The Law of Contracts, Corporation Law, Partnership Law.

## PUBLIC REGULATION OF INDUSTRY AND TRADE

**31. Transportation and Communication.** First term. Credit three hours. Open to upperclassmen who have credit for Economics 21a. Assistant Professor O'LEARY. T Th S 9. *Goldwin Smith* 256.

Public policy in methods of organization and administration of transportation.

**35. Industrial Combinations.** Second term. Credit three hours. Prerequisite, Economics 31, or consent of the instructor. Professor HOMAN. T Th S 9. *Goldwin Smith* 256.

A study of the concentration of industrial control, including a survey of the trust movement, trade associations, anti-trust legislation and legal decisions, and the present problem of public regulation of industry and trade.

The attention of students is called to the following related work: American Government, Social and Political Ethics, Taxation, Law of Public Service and Carriers, Law of Restraints on Business and Industry.

## LABOR AND INDUSTRIAL RELATIONS

**43. Trade Unionism in the United States.** First term. Credit three hours. Prerequisite, Economics 1 or its equivalent. Professor SLICHTER. M W F 9. *Goldwin Smith* 256.

A study of the origins, development, philosophies, aims, and policies of American trade unionism with special reference to the factors which have determined the character of the American labor movement and with emphasis on current problems of unionism and on present trends in union policies. A special materials fee of \$1.50 is charged for use of books and pamphlets in the Industrial Relations Library.

**44. The State in Relation to Labor.** Second term. Credit three hours. Consult the instructor before registering. Professor SLICHTER. M W F 9. *Goldwin Smith* 264.

An examination of the efforts of the State to assist in the solution of the labor problem. Conciliation, arbitration, industrial courts, the legal minimum wage, workmen's compensation, labor exchanges, social insurance, administrative machinery and problems.

**46. Union Shop Rules and Policies.** Second term. Credit three hours. Consult the instructor before registering. Professor SLICHTER. Hours to be arranged.

An intensive study of the shop rules and policies of trade unions in different industries with special emphasis upon the conditions giving rise to specific rules and policies and the effects upon unions and upon production.

**47. Collective Bargaining.** Second term. Credit three hours. Consult the instructor before registering. Professor SLICHTER. Hours to be arranged.

The evolution of trade agreements and the experience under representative trade agreements will be studied in some detail.

**49. Research in Industrial Relations.** Throughout the year. Credit two hours a term. Consult the instructor before registering. Professor SLICHTER. Hours to be arranged.

Discussions and individual investigations of current and theoretical problems in the field of industrial relations.

The attention of students is called to the following work: Elementary Social Science, Constitutional History of the United States, Political Institutions, The American Federal System, Fundamental Rights and Immunities, Social and Political Ethics, Constitutional Law, Law of Restraints on Business and Industry.

## SOCIAL SCIENCE

\*50a. **Introduction to Sociology.** First term. Credit three hours. Assistant Professor WOODWARD. T Th 9 and an hour to be arranged. *Goldwin Smith* 142.

A study of racial and cultural origins and of the factors determining organic evolution and cultural development.

**50b. Introduction to Sociology.** Second term. Credit three hours. Prerequisite, Economics 50a. Assistant Professor WOODWARD. T Th 9 and an hour to be arranged. *Goldwin Smith 142.*

The social development of human personality; the behavior of crowds; social control and social progress.

**51. Social Problems.** First term. Credit three hours. Prerequisite, Economics 50b. Consult instructor before registering. Assistant Professor WOODWARD. T Th S 11. *Goldwin Smith 264.*

A continuation of course 50b applying progress criteria there developed to such social problems as those of population numbers and quality, immigration, racial and cultural adjustment, juvenile delinquency and crime, poverty and dependency.

**54. The Family.** Second term. Credit three hours. Prerequisite, Economics 50b and the consent of the instructor. Assistant Professor WOODWARD. T Th S 11. *Goldwin Smith 264.*

The historical backgrounds of the modern American family; current disorganization of the American family as a social problem; the problem of individual adjustment to current family mores. Group reports will form the basis of class discussion.

Enrollment limited to twenty-five students.

The attention of students is called to the following related work: Rural Sociology, Family Income and Expenditure, The Place of the Household in Society, The Family, Biology of the Human Species, Genetics, Political Institutions, and General Psychology.

#### STATISTICS

**76a. Population Statistics.** First term. Credit three hours. Open only to those who have taken Economics 50b or are majoring in Economics. Professor WILLCOX. M W F 11. *Goldwin Smith 256.*

An introduction to the statistics of the population of the United States and of New York State based mainly upon the federal census and the New York State registration statistics. The course gives an introduction to the methods and results of statistics in this its best developed branch.

**76b. Economic Statistics.** Second term. Credit three hours. Prerequisite, Economics 76a. Students majoring in Economics who have not had course 76a or its equivalent may be admitted by special permission. Professor WILLCOX. M W F 11. *Goldwin Smith 256.*

A continuation of course 76a, dealing mainly with the agricultural, industrial, and commercial statistics of the United States. The course is an introduction to statistics in its application to more difficult fields, such as production, wages, prices, and index numbers.

**79a. History and Statistics of International Migrations.** First term. Credit two hours. Open to those who are majoring in Economics. Professor WILLCOX. T 4-6. *Goldwin Smith 259.*

The Statistics of international migrations from and into the leading countries of the world since the beginning of the records about a century ago will be studied.

**79b. American Racial Problems.** Second term. Credit two hours. Open to those who are majoring in Economics. Professor WILLCOX. T 4-6. *Goldwin Smith 259.*

The increase and redistribution of races over the earth since 1500 A. D. and the problems growing out of present race relations in the United States.

#### ECONOMIC THEORY

**81. Economics of Enterprise.** First term. Credit three hours. Primarily for seniors majoring in Economics. Professor HOMAN. T Th S 10. *Goldwin Smith 264.*

An analytical treatment of the theory of prices and incomes.

**82. National Wealth and Income.** Second term. Credit three hours. Primarily for seniors majoring in Economics. Professor HOMAN. T Th S 10. *Goldwin Smith* 264.

A study of some major economic problems, designed to illustrate the interrelations among the various parts of our economic system, and to assist in forming a basis for the appraisal of the system's functioning.

**83. The Rise of Modern Capitalism.** First term. Credit three hours. Prerequisite, Economics I or its equivalent. Professor HOMAN. T Th S 11. *Goldwin Smith* 256.

A survey of the growth of economic institutions and ideas from the end of the Middle Ages to the nineteenth century.

**85. Systematic Economic Theory.** Second term. Credit two hours. Primarily for graduate students. Professor HOMAN. Hours to be arranged.

A critical examination of the purpose, scope, and methodology of systematic theoretical analysis.

**86. History of Economic Thought.** First term. Credit two hours. Primarily for graduate students. Professor HOMAN. Hours to be arranged.

An inquiry into the development of economic ideas and methods of analysis, as related to the changing intellectual and institutional content of western civilization.

The attention of students is called to the following related work: Political Philosophy and Science; Social and Political Ethics; Ethics of Modern Utilitarianism; Psychology; Constitutional Law; Law of Taxation; Mathematical Economics.

#### INFORMAL STUDY AND HONORS IN ECONOMICS

The direction of informal study in economics, and the assistance of candidates for the degree with honors in economics is in charge of Professor ENGLISH.

#### EDUCATION

Psychology I is prerequisite to all courses in Education.

**1. Educational Psychology.** Repeated in second term. Credit three hours. Lectures and recitations. First term, Assistant Professor FREEMAN and Mr. HULSE. M W F 11. *Goldwin Smith* 234. Second term, Professor OGDEN, Section I, T Th S 11, *Goldwin Smith* 134; Assistant Professor FREEMAN, Section II, M W F 10. *Goldwin Smith* 234.

A study of functional psychology with special reference to the learning process and its application to educational theory and practice. Students must apply at *Goldwin Smith* 251 for assignment to sections.

**2. Principles of Secondary Education.** Second term. Credit three hours. Prerequisite, Education I. Section I, M W F 2. Professor JORDAN. *Goldwin Smith* 234. Section II, T Th S 12. Assistant Professor FREEMAN. *Goldwin Smith* 234.

The nature and significance of education; biological and psychological foundations; the secondary school as a social institution; educational ideas and values; the curriculum. Students who elect course 2 must apply at *Goldwin Smith* 251 for assignment to sections.

**[3. History of Education.** (a) (Greek, Roman, and Early Medieval.) First term. Credit two hours. Open to upperclassmen and graduates only. T Th 10. Boardman C. Professor LAISTNER. (See History 7.) (b) (Late Medieval and Modern). Second term. Credit two hours. Open to upperclassmen and graduates only. T Th 10. *Goldwin Smith* 234. Professor SMITH. (See History 29.) Not given in 1930-31.]

**4. Method and Procedure in High School Teaching.** First term. Credit three hours. For seniors only. Professor JORDAN. M W F 11. *Goldwin Smith* 264. M W F 3. *Goldwin Smith* 256.

Designed for students who expect to teach in secondary schools. The relation and duties of high school teachers to their students, to the community, and to the

state; methods of class management and types of recitation. Observation of actual high school classes required.

**4a. Observation and Practice in High School Method.** First term. Credit one hour. For seniors only. Professor JORDAN and Mr. HULSE. M 4. *Goldwin Smith* 256.

Planned to be taken coincidentally with course 4, and required of students desiring to meet the New York State requirements for the provisional professional certificate.

**4b. Practice in High School Method.** Second term. Credit two hours. For seniors only. Prerequisite, courses 4 and 4a. Mr. HULSE. M 4. *Goldwin Smith* 256.

This course is limited to students needing two additional hours credit in observation and practice to meet State education requirements. Enrollment is limited to students specifically recommended by the Department of Education. The work will involve daily observation and practice in the Ithaca High School under supervision of selected teachers and under the general direction of the Department of Education. Conferences will be held once a week with the instructor in charge.

**5. Philosophy of Education.** Second term. Credit two hours. Prerequisite, Education 1 and at least one course in Philosophy. Professor OGDEN. W 2-4. *Goldwin Smith* 248.

A study of education as interpreted by the more important philosophical conceptions and theories, with special application to the spirit and demands of modern society.

**6. Experimental Education.** Second term. Credit two hours. Prerequisite, Education 1 and permission of the instructor. Assistant Professor FREEMAN. Hours to be arranged. *Goldwin Smith* 248.

The chief problems of experimental education; the application of psychological and statistical methods to problems in educational psychology; chief results and practical bearings.

**7. Mental and Educational Measurements.** First term. Credit three hours. Prerequisite, Education 1 and permission of the instructor. Assistant Professor FREEMAN. T Th S 9. *Goldwin Smith* 225.

The nature of intelligence. The history of the development of individual and group tests of intelligence; principles underlying their formation and application; the use of tests of intelligence in dealing with defective and superior children, and with problem cases; their use in general school problems and in fields outside the school. The theory, construction and use of educational tests. Demonstration in administering tests.

**8. Experimental Investigation.** Repeated in second term. Credit and hours to be arranged. Prerequisite, Education 6 or 7. Professor OGDEN and Assistant Professor FREEMAN. *Goldwin Smith* 248.

Experimental study of a special problem in educational psychology or in mental measurements.

**10. City School Administration and Supervision.** Throughout the year. Credit two hours a term. Prerequisite, Education 1. Professor JORDAN. M W 9. *Goldwin Smith* 248.

Principles of administration and supervision of state and city school systems, involving problems of evaluation and improvement of teaching, and of the subject matter in the public schools. The course will be adapted to the particular needs of the class.

**[12. The Junior High School.** Throughout the year. Credit two hours. For seniors, graduates, and other qualified students. Professor JORDAN. W 4-6. *Goldwin Smith* 234. Consent of the instructor to be obtained. Not given in 1930-31.]

**13. History of American Education.** First term. Repeated second term. Credit three hours. Prerequisite, Education 1, or its equivalent. Mr. HULSE. T Th S 10. *Goldwin Smith* 225.

A survey of educational change in the United States from the beginning of the seventeenth century to the present, with special emphasis on public schools, and consideration of the religious, economic, political, and social factors affecting education. European influences throughout the period will also be considered briefly.

**16. Readings in the History of Education.** Second term. Credit two hours. Prerequisite, Education 1 and 13, or permission of the instructor. Mr. HULSE. Hours to be arranged. *Goldwin Smith* 248. Primarily for graduate students. An advanced course, emphasizing the historic changes in aims and methods.

**17. Mental Development.** First term. Credit two hours. Prerequisite, Education 1. Assistant Professor FREEMAN. W 2-4. *Goldwin Smith* 248.

A course in child psychology, dealing with the facts of mental growth and their interpretation, with special emphasis upon theories of learning.

**20. Seminary in Education.** First term. Credit two hours. Prerequisite, Education 1. Professor OGDEN. M 4-6. *Goldwin Smith* 248.

Topics relevant to the fundamental assumptions of educational theory will be chosen. Primarily for graduate students.

**21. Seminary in Education.** Second term. Credit two hours. Admission by permission of the instructor. Professor JORDAN. M 4-6. *Goldwin Smith* 248.

Topics developing from historical and current problems of educational practice, especially as related to administration and conduct of the public school system and of the university. Primarily for graduate students.

The attention of students is called to the announcement of the Division of Education.

## ENGLISH

### FOR FRESHMEN

**\*1. Elementary Composition and Literature.** Throughout the year. Credit three hours a term. Messrs. BALDWIN, JOHNSON, ELSON, and BISSELL. M W F 8, 9, 10, 11, 12; T Th S 8, 9, 11, 12. Rooms to be announced.

This course is open to underclassmen in Agriculture, Architecture, Chemistry, and Home Economics who have satisfied the entrance requirements in English. A study of composition in connection with the reading of representative works in English literature. Students who have not taken the course in the first term may enter in the second term.

Students who elect English 1 must apply at *Roberts* 292 on Monday, Tuesday, or Wednesday of registration week for assignment to sections. Registration in the course is in charge of Mr. Baldwin.

**\*3. Introductory Course.** Throughout the year. Credit three hours a term. Assistant Professors SMITH and FRENCH, Doctors MARX and KESSEL, Messrs. CARROLL, MITCHELL, LINDSAY, and MULLER. M W F 8, 9, 10, 11, 12; T Th S 8, 9, 10, 11. Rooms to be announced.

Chaucer, Shakespeare, Milton, Boswell, Goldsmith, Browning, Thackeray; practice in composition, with conferences. Designed for freshmen who are candidates for the degree of Bachelor of Arts. Students who elect English 3 must apply at *Goldwin Smith* A on Monday, Tuesday, or Wednesday of registration week for assignment to sections. The course is in charge of Professor Smith.

**\*4. Introduction to Poetry.** Throughout the year. Credit one hour a term. Open only to freshmen enrolled in English 1 or 3. Professor SAMPSON. M 12. *Goldwin Smith* A.

Lectures on English poetry, with assigned readings.

### FOR SOPHOMORES

**\*20. Prose and Composition.** Throughout the year. Credit three hours a term. Prerequisite, English 1, 3, or 21. M W F 9, Dr. MARX, *Goldwin Smith* 164; M W F 10, Assistant Professor BROUGHTON, *Goldwin Smith* 164; M W F 11, Assistant Professor MONROE, *Goldwin Smith* 164; M W F 12, Professor SIBLEY, *Goldwin Smith* 164; T Th S 9, Professor HEBEL, *Goldwin Smith* 164;



T Th S 10, Assistant Professor MONROE, *Goldwin Smith* 164; T Th S 12, Assistant Professor FRENCH, *Goldwin Smith* 164.

Reading of nineteenth century prose; instruction and practice in composition.

**\*21. Composition and Literature.** Throughout the year. Credit two hours a term. Assistant Professor FRENCH and Messrs. LINDSAY and JOHNSON. Hours and rooms to be arranged.

Study of literature, and practice in composition, with conferences. Open only to those students in the College of Engineering who have not completed their sophomore requirements in English. Registration is in charge of the College of Engineering.

**\*22. Nineteenth Century Poetry.** Throughout the year. Credit three hours a term. Prerequisite, English 1 or 3. Professor SAMPSON. Conferences with Dr. KESSEL. M W F 11. *Goldwin Smith* A.

Wordsworth, Coleridge, Byron, Shelley, and Keats.

#### FOR UPPERCLASSMEN AND GRADUATES

**30. History of English Literature.** Throughout the year. Credit three hours a term. Prerequisite, twelve hours of English. Professor STRUNK. T Th S 10. *Goldwin Smith* 156.

Lectures on English literature, with readings and reports.

**32. Old English.** Throughout the year. Credit three hours a term. Open to upperclassmen and graduates. Assistant Professor MONROE. M W F 9. *Goldwin Smith* 162.

Old English grammar. Reading of selections from the *Old English Chronicle*, King Alfred, Aelfric, and other representative prose texts, and of the simpler poetry. A part of the second term is devoted to early Middle English, with supplementary reading on the growth of the language.

This course is recommended by the Department to those intending to teach English.

**34. Old English Literature.** Second term. Credit two hours. Open to graduates and qualified seniors. Assistant Professor MONROE. T Th 3, or other hours to be arranged. *Goldwin Smith* 162.

Reading of selected Old English works including *Beowulf* or some of the Cynewulfian poetry; studies in textual criticism and in style and metre; supplementary reading.

**38. Middle English Metrical Romances.** First term. Credit two hours. Open to juniors, seniors, and graduates who have had a course in Old or Middle English. Hours to be arranged. Assistant Professor FRENCH.

**40. Chaucer.** Throughout the year. Credit two hours a term. Open to seniors and graduates, and to juniors by special permission. Professor STRUNK. M W 3. *Goldwin Smith* 164.

First term: Chaucer's life and times; the shorter poems and *Troilus and Criseida*. Second term: *The Canterbury Tales*, readings in Langland and Gower.

**42. The English Drama to 1642.** Throughout the year. Credit three hours a term. Prerequisite, twenty-four hours of University credit with a grade of A or B. Professor ADAMS. M W F 11. *Goldwin Smith* 142.

First term: the origin of the drama; mysteries, moralities; interludes; the first regular comedies and tragedies. Second term: the contemporaries and successors of Shakespeare.

**[44. Shakespeare.** First term. Credit three hours. Prerequisite, twenty-four hours of University credit with a grade of A or B. Professor ADAMS. M W F 12. *Goldwin Smith* B. Not given in 1930-31.]

**46. Shakespeare.** Throughout the year. Credit three hours. Prerequisite, twelve hours of English. Professor STRUNK. M W F 10. *Goldwin Smith* 156. First term: comedies; second term: tragedies.

**48. Spenser.** First term. Credit three hours. Open to upperclassmen and graduates. Professor HEBEL. M 8 p. m. *Goldwin Smith* 338.

A study of the poetry of Spenser with such a survey of his immediate predecessors and contemporaries as is necessary for an understanding of his historical position.

**50. Seventeenth Century Literature.** First term. Credit three hours. Open to upperclassmen and graduates. Professor HEBEL. T Th S 11. *Goldwin Smith* 234.

A study of English literature, history, and philosophy of the seventeenth century; Bacon, Donne, Herbert, Vaughan, Traherne, Jonson, Herrick, Carew, Suckling, Burton, Browne, Walton, Pepys.

**52. Milton.** Second term. Credit three hours. Open to upperclassmen and graduates. Professor HEBEL. T Th S 11. *Goldwin Smith* 234.

A study of Milton's poetry and selections from his prose.

**54. Eighteenth Century Poetry.** Throughout the year. Credit two hours a term. Open to upperclassmen. First term: Professor PRESCOTT; second term: Assistant Professor MONROE. T Th 12. *Goldwin Smith* 156.

English poets of the Restoration and the eighteenth century; Dryden, Pope, Thomson, Gray, Collins, Goldsmith, Cowper, and Burns; the lesser English and Scottish poets; beginnings of the English Romantic movement.

**56. Eighteenth Century Prose.** Second term. Credit two hours. Open to upperclassmen and graduates. Assistant Professor BROUGHTON. T Th 9. *Goldwin Smith* 134.

A study of the leading prose writers of the century: Defoe, Swift, Addison, Steele, Goldsmith, Johnson, Burke, and others.

**58. Biography.** First term. Credit two hours. Open to upperclassmen, and, with the permission of the instructor, to sophomores. Assistant Professor SMITH. T Th 3. *Goldwin Smith* 134.

Boswell's *Johnson*, Gibbon, Borrow.

**60. Eighteenth Century Novel.** First term. Credit two hours. Open to upperclassmen and graduates. Assistant Professor BROUGHTON. T Th 9. *Goldwin Smith* 134.

The origin of the modern English novel and its development to the end of the eighteenth century. Lectures, recitations, and extensive reading in Defoe, Richardson, Fielding, Smollett, Sterne, and others.

**62. Wordsworth and his Contemporaries.** Throughout the year. Credit three hours a term. Open to upperclassmen and graduates. Assistant Professor BROUGHTON. M W F 9. *Goldwin Smith* 156.

First term: a detailed study of the works of Wordsworth and their influence on contemporary English thought and literature. Second term: the contemporaries of Wordsworth.

**64. Byron and Shelley.** Second term. Credit two hours. Open to upperclassmen who have passed twelve hours of English with a grade of A or B. Professor PRESCOTT. T Th 12. *Goldwin Smith* 162.

In 1930-31, a study of Byron's life, his principal works, and his influence.

**66. Nineteenth Century Prose.** Throughout the year. Credit two hours a term. A student may not receive credit for both English 20 and 66. Open to upperclassmen and graduates. Assistant Professor BROUGHTON. W 4-6. *Goldwin Smith* 160.

Extensive reading in nineteenth century prose, with some attention to the literary criticism and theories of style of the period; frequent reports and a term essay.

**68. Victorian Literature.** First term. Credit three hours. Open to upperclassmen and graduates. Professor NORTHUP. M W F 9. *Goldwin Smith* 134. Lectures on the chief characteristics and literary tendencies of the period; studies of Browning, Tennyson, and the greater writers of prose.

**[69. Victorian Literature.** Second term. Credit three hours. Prerequisite, English 68. Open to upperclassmen and graduates. Professor NORTHUP. M W F 9. *Goldwin Smith* 134. Not given in 1930-31.]

Studies of Arnold, Morris, Swinburne, and some other poets, and of the greater writers of fiction.

**70. American Literature.** First term. Credit three hours. Open to seniors and graduates. Professor PRESCOTT. M W F 12. *Goldwin Smith* 156.

American literature of the colonial and revolutionary periods; the growth of literary independence; Irving, Bryant, and Cooper.

**72. American Literature.** Second term. Credit three hours. Prerequisite, English 70. Open to seniors and graduates. Professor PRESCOTT. M W F 12. *Goldwin Smith* 156.

American prose and poetry of the nineteenth century.

**74. The English Language.** First term. Credit two hours. Open to upperclassmen. T Th 12. Assistant Professor MONROE. *Goldwin Smith* 162.

The development of the English language, with consideration of language in general, including elementary phonetics. Recitations, lectures, collateral reading. The course does not require previous knowledge of Old and Middle English.

**76. English Usage and Style.** Throughout the year. Credit three hours a term. Open to seniors and to a limited number of juniors. Professor STRUNK. T Th S 9. *Goldwin Smith* 160.

The first term is devoted chiefly to composition. The second term includes, along with composition, the study of the theory of good English, the study of words, idioms, and pronunciation, and related topics.

**78. Short Story Writing.** Throughout the year. Credit three hours a term. Open to upperclassmen after consultation with the instructor. Assistant Professor SMITH. T Th S 10. *Goldwin Smith* 160.

**80. Playwriting.** Throughout the year. Credit two hours a term. Open only to graduates and upperclassmen after consultation with the instructor. Professor SAMPSON. T Th 12. *Goldwin Smith* —.

**84. English Poetry.** Throughout the year. Credit three hours a term. Open to upperclassmen after consultation with the instructor. Professor PRESCOTT. M W F 10. *Goldwin Smith* 162.

A general course in the nature of poetry and of poetic forms with reading of illustrative poems.

**90. Dramatic Structure.** Throughout the year. Credit two hours a term. Open to seniors and graduate students. Professor SAMPSON. T Th 11. *Goldwin Smith* 156.

A study of the principles of dramatic construction based upon Greek, Elizabethan, and classical French drama (first term), and modern drama (second term).

**98. Teachers' Course.** First term. Credit two hours. Open to seniors and graduates. Professor NORTHUP. T Th 12. *Goldwin Smith* 227.

Lectures, readings, and conferences on the teaching of English in the secondary schools.

#### FOR GRADUATES

**104. Restoration Drama.** Throughout the year. Dr. MARX. Room and hour to be arranged.

Dryden, Davenant, Etherege, Shadwell, Otway, Wycherley, Congreve, Vanbrugh, Farquhar, and others. First term, Restoration tragedy and the heroic play. Second term, Restoration comedy.

**110. Seventeenth Century Literature.** Throughout the year. Professor HEBEL. Room and hour to be arranged.

A study, with reports, of the problems of research in seventeenth century literature, designed to introduce the student to various modes of literary investigation.

**115. Eighteenth Century Literature.** Throughout the year. Assistant Professor BROUGHTON. Room and hour to be arranged.

A study of the influences, tendencies, literary criticism, thought, and life of the eighteenth century.

**116. Pastoral Poetry.** Assistant Professor BROUGHTON.

A study of the sources and development of the appreciation of rustic life and landscape in poetry from Theocritus to recent writers.

**125. Old English.** Throughout the year. Assistant Professor MONROE. Room and hour to be arranged.

**130. English Literature, 1500-1640.** Throughout the year. Professor ADAMS. M W F 12. *Goldwin Smith* 338.

A study of the non-dramatic literature of England from the beginning of the Renaissance to Milton, with emphasis on the earlier period. Members of the class will be expected to purchase available texts; the rarer works will be placed on reserve in the Hart Memorial Library.

**131. Methods and Materials in Elizabethan Research.** First term. Professor ADAMS. Hours to be arranged. *English Seminary Room*.

Elizabethan handwriting; sixteenth century printing and publishing; the important books of reference for the scholar; scientific bibliography; textual criticism; the editing of Elizabethan works; the technique of research.

**132. Shakespeare.** Second term. Professor ADAMS. Hours to be announced. *English Seminary Room*.

Problems connected with Shakespearean research; Elizabethan theatrical conditions; censorship of plays; the making of playhouse manuscripts; the transmission of the text. A special study will be made of *Hamlet*.

**135. Nineteenth Century Fiction.** First term. Professor NORTHUP. Th 4-6. *Goldwin Smith* 338.

Studies in the development of the novel from Scott to Meredith.

**137. Middle English Literature.** First term. Professor NORTHUP. Room and hour to be arranged.

**138. The American Short Story.** Second term. Assistant Professor SMITH. Room and hour to be arranged.

A study of the short story as reflecting the social background of America.

**140. American Literature.** Throughout the year. Professor PRESCOTT. Room and hour to be arranged.

**144. Modern Critical Theories.** Throughout the year. Professor STRUNK. Room and hour to be arranged.

A study of literary theory and criticism in authors of the nineteenth and twentieth centuries.

**145. Shakespeare.** Throughout the year. Professor STRUNK. Room and hour to be arranged.

Textual and critical study of selected plays.

**146. Byron and Shelley.** Throughout the year. Professor PRESCOTT. Room and hour to be arranged.

**150. Elizabethan Drama.** Throughout the year. Professor SAMPSON. Hour to be arranged. *Goldwin Smith* 159.

Webster, Middleton, Beaumont and Fletcher.

**151. Structure of the Lyric.** Throughout the year. Professor SAMPSON. M 2. *Goldwin Smith* 160.

A study of the short lyric in respect to the arrangement of its substance; discussion of significant poets.

## GEOLOGY

*Students who intend to major in Geology, should if possible consult the Department not later than the beginning of the sophomore year.*

**\*100. Introductory Geology.** Repeated in the second term. Credit three hours. Professor RIES, Dr. BURFOOT, Mr. MEGATHLIN, and Mr. CONANT. Lectures first term, T Th 11; second term, T Th 9. *Sibley Dome*. Laboratory, M T W Th F afternoons 1:40, or S morning 8, if necessary. *McGraw*.

Students must register for laboratory assignment at *Geology Laboratory, McGraw*, before the beginning of the course. The fundamental principles of this branch of science. The inorganic aspects of the subject are emphasized more than the organic.

**\*400. Historic Geology.** Repeated in the second term. Credit three hours. Prerequisite, Geology 100 or its equivalent; a course in zoology is also desirable.

Professor HARRIS. Lectures, T Th 10. Laboratory to be arranged. *McGraw*. An elementary review of the geologic history of the earth and its inhabitants, with special emphasis on American Geology. Field trips in laboratory periods.

Courses 101, 102, 200, 201, 311, and 500 (first term) may also be taken following Course 100.

#### DYNAMIC AND STRUCTURAL GEOLOGY

**\*101. Major Problems in Geology.** Second term. Credit three hours. Prerequisite, Geology 100 or 501. Assistant Professor NEVIN. Lectures, T Th 11, F 2. *McGraw*. Registration limited to students who have received a grade of "C" or better in the prerequisite course.

A study of some of the interesting problems of Geology.

**102. Structural Geology.** First term. Credit three hours. Prerequisite, Geology 100 or the equivalent. Assistant Professor NEVIN. Lectures, T Th 11. Laboratory, T 1:40. *McGraw*.

A study of geologic structures and their causes. Part of the laboratory periods will be spent in the field.

**103. Sedimentation.** First term. Credit three hours. Prerequisite, Geology 100. Assistant Professor NEVIN. Lectures, T Th 9. Laboratory, Th 1:40. *McGraw*.

Part of the laboratory periods will be spent in the field. This course is devoted to a study of the principles involved in the formation of sediments. Registration by permission.

**105. Metamorphic Geology.** First term. Credit two hours. For advanced students. Dr. BURFOOT. M W 9. *McGraw*.

The processes and criteria of rock metamorphism.

**106. Special Work in Structural Geology.** Throughout the year. Credit variable. Prerequisites variable. Assistant Professor NEVIN. Hours to be arranged. *McGraw*.

For advanced students and graduates. Original investigation adapted to the needs of the student.

**107. Geologic Mapping.** Second term. Credit two hours. Prerequisite, Geology 100. Assistant Professor NEVIN. F 10, and field work all day Saturday after spring vacation.

A discussion of the fundamental methods used in geologic mapping, together with practical work in the field. For students majoring in Geology. Registration by permission.

#### PHYSICAL GEOGRAPHY

**\*200. Elementary Physical Geography.** Throughout the year. Open to freshmen. Credit three hours a term; if taken after Geology 201, credit two hours a term. Prof. VON ENGELN and Dr. COLE. Lectures M W 9. *McGraw, Geology Lecture Room*. Laboratory, W or Th 1:40. Students must register for laboratory assignments at the *Physical Geography Laboratory* on registration days.

All students are required to go on one all-day excursion to Taughannock Gorge and Falls.

**\*201. Physiography of the Lands and Oceanography.** Second term. Credit three hours. Open only to freshman and sophomore students who have had Geology 100. Professor VON ENGELN and Dr. COLE. Lectures M W F 11. *McGraw, Physical Geography Laboratory*.

The systematic and cyclic development of land forms under humid, arid, and glacial conditions, and the interpretation of such forms; oceanic phenomena and

processes. Intended for students who desire a scientific appreciation of the inorganic elements of the landscape.

203. **Geography of North America.** Second term. Credit two hours. Students should consult instructor before registering. Professor VON ENGELN. Lectures, T Th 10. *McGraw, Geology Lecture Room.*

The physiographic features of North America; discussion of their influence upon the settlement and development of the various sections.

204. **Model Making.** First term. Credit three hours. Prerequisites, either Geology 100 or 200, or their equivalent. Open only to upperclassmen and then by permission. Intended chiefly for students majoring in Geology. Dr. COLE. Lecture, T 10, one laboratory, M 1:40, other period by arrangement. *McGraw.*

205. **Glaciers and Glaciation.** Second term. Credit three hours. Prerequisite, Geology 200 or, with permission, Geology 100. Professor VON ENGELN and Dr. COLE. Lectures, T Th 11. Laboratory, T 1:40. *McGraw.*

Living glaciers and the phenomena of the glacial period. Students are required to have one or more Saturdays free for all-day excursions in the spring. Mapping and interpretation of glacial deposits.

206. **Commercial Geography.** First term. Credit two hours. Prerequisite, Geology 200 or Economics 1. Professor VON ENGELN. Lectures, T Th 11. *McGraw, Geology Lecture Room.*

The geographic factors affecting production and distribution of commodities. Discussion of the geographic origins and nature of commercial exchange of goods, routes of commerce, localization of industry, modern city sites, utilization of tropical lands, etc.

208. **Advanced Physiography, Experimental and Research Work.** Throughout the year. Credit variable. Registration by permission. Professor VON ENGELN. Day and hour to be arranged. *McGraw.*

Original investigation by each student; reading, conferences, excursions, and presentation of reports of progress. In general, graduate students registering for a minor in physical geography will be expected to take up some problem in this course.

209. **Seminary.** First or second term. Credit two hours. For upperclassmen and graduate students with requisite preparation. Registration by permission. Professor VON ENGELN. Day and hour to be arranged. *McGraw, Physical Geography Laboratory.*

Preparation and reading of reports upon special topics; abstracts and discussions of current geographic literature.

**Meteorology and Climatology.** (See Announcement of the College of Agriculture.)

#### MINERALOGY AND PETROGRAPHY

\*311. **Elementary Mineralogy.** Repeated in second term. Credit three hours; if taken after Geology 312, two hours. Prerequisite, Chemistry 101. Dr. TRAINER, and Mr. ———. Lectures, M W 8. Laboratory, W Th 1:40 and additional hours if necessary. *McGraw, Geology Lecture Room.*

For beginners who desire a general knowledge of the commonest minerals, their uses, the properties by which they are recognized, and their significance as constituents of the earth's crust, or as sources of useful substances.

312. **Crystallography.** First term. Credit three hours; if taken after Geology 311, two hours. Prerequisite, Chemistry 205 or 210, and Physics 3. Professor GILL. Lectures, T Th 8. Laboratory to be arranged. *Geology Lecture Room, McGraw.*

313. **Mineralogy.** Second term. Credit three hours; if taken after Geology 311, credit two hours. Prerequisite, Geology 312. Professor GILL. Lectures, T Th 8. Laboratory to be arranged. *Mineralogy Laboratory, McGraw.*

For students wishing to become acquainted with the commoner minerals and with the scientific and practical problems which they present.

**314. Blowpipe Determination of Minerals.** First term. Credit one hour. Prerequisite, Geology 311 or 313, and Chemistry 205 or 210. Dr. TRAINER. Saturday morning. *Blowpipe Laboratory, McGraw.*

**315. General Lithology.** Second term. Credit one hour. Prerequisite, Geology 100 and 311. Professor GILL. Lectures, laboratory, and recitations, S 8-10. *Mineralogy Laboratory, McGraw.*

An elementary course designed to teach recognition of the various kinds of rocks, their mineral composition, mode of origin, and physical properties.

**316. Crystal Measurement and Drawing.** Second term. Credit two hours. Prerequisite, Geology 312, and Trigonometry. Professor GILL. Day and hour to be arranged. *Mineralogy Laboratory, McGraw.*

Laboratory measurement of crystals, with computation and drawing. Course 316 should be taken after course 312 by students who intend to continue in course 317, or in course 320.

**317. Optical Determination of Minerals.** First term. Credit three hours. Prerequisite, Geology 313. Professor GILL. Lectures, M W. Laboratory, to be arranged at time of registration. *Petrography Laboratory, McGraw.*

**318. Petrography.** Second term. Credit three hours. Prerequisite, Geology 317. Professor GILL and ———. Lectures, M W. Laboratory, to be arranged at time of registration. *Petrography Laboratory, McGraw.*

**319. Sedimentary Petrography.** Second term. Credit three hours. Prerequisite, Geology 317. Dr. TRAINER. Hours to be arranged. *McGraw.*

The methods of investigating the mineral composition, texture, and other physical characteristics of sedimentary rocks; some of the applications of these methods to geological problems.

**320. Advanced or Special Work in Mineralogy, Crystallography, or Petrography.** Throughout the year. Credit variable. Prerequisite, variable. Professor GILL and Dr. TRAINER. Day and hour to be arranged. *McGraw.*

Adapted to the needs of the individual student.

**321. Seminary in Mineralogy and Crystallography.** Throughout the year. Credit one hour a term. Prerequisite, Geology 312, 313, and 317. Professor GILL. M 4:15. *Mineralogy Laboratory, McGraw.*

#### PALEONTOLOGY AND STRATIGRAPHIC GEOLOGY

**\*400. Historic Geology.** Repeated in the second term. Credit three hours. Prerequisite, Geology 100 or the equivalent; a course in zoology is also desirable. Professor HARRIS. Lectures, T Th 10. Laboratory, to be arranged. *McGraw.*

An elementary review of the geologic history of the earth and its inhabitants, with special emphasis on American geology; the second half of the course in elementary geology. Field trips in laboratory periods.

**401. General Stratigraphic Geology.** Throughout the year. Credit two hours a term. Prerequisite, Geology 100, 400, 403, and reading knowledge of French and German. Professor HARRIS. First term, T Th 10; second term T Th 8. *McGraw 28.*

**403. Invertebrate Paleontology.** Throughout the year. Credit two hours a term. Prerequisite, Invertebrate Zoology or Biology. Pelecypoda and Gastropoda. Professor HARRIS. M W 8. *McGraw 28.*

**404. Invertebrate Paleontology.** Throughout the year. Credit two hours a term. Prerequisite, Invertebrate Zoology or Biology. Cephalopoda and Brachio-poda. Professor HARRIS. Day and hour to be arranged. *McGraw 28.*

**405. Invertebrate Paleontology.** First term. Credit three hours. Prerequisite, Invertebrate Zoology or Biology. Microscopic organisms. Professor HARRIS. Day and hour to be arranged. *McGraw 28.*

**406. Paleontologic Problems.** Throughout the year. Credit variable. Prerequisite, Geology 400 and 403. Professor HARRIS. Day and hour to be arranged. *McGraw 28.*

**407. Paleontology and Stratigraphy of South America.** Throughout the year. Credit two hours. Hours to be arranged. Professor HARRIS. *McGraw* 28.

#### ECONOMIC GEOLOGY

**500. General Economic Geology.** Throughout the year. Credit three hours a term. Prerequisite, first term, Geology 100 and a course in elementary Chemistry; second term, 100 and 311. Professor RIES and Mr. TUCK. Lectures, M W 10. Laboratory, F 1:40. *McGraw*.

The origin, nature, distribution, uses and economic value of mineral products. First term, non-metallics, including coal, oil, gas, fertilizers, etc.; second term, the ore deposits of the different metals.

**\*501. Engineering Geology.** Repeated in second term. Credit four hours. For engineering students. Professor RIES and Mr. TUCK. Lectures, M W 11. Two laboratory periods, M W or T Th 1:40. *McGraw*. Not the equivalent of Geology 100.

A discussion of the practical application of geologic principles to engineering work, and of the occurrence of such economic materials as are of importance to engineering students.

**502. Petroleum Geology.** Second term. Credit three hours. Prerequisite, Geology 100. Assistant Professor NEVIN. Lectures, T Th 9. Laboratory, Th 1:40. *McGraw*.

A course on the geology, geologic field methods, distribution, and methods of obtaining petroleum.

**510. Clay Investigation.** Second term. Credit three hours. Prerequisite, Geology 100 or 501, and Chemistry 101, and permission of the instructor. Professor RIES and Dr. BURFOOT. One lecture and two laboratory periods to be arranged. *McGraw*. Registration by permission.

**511. Advanced or Special Work in Economic Geology.** Throughout the year. Credit variable. Prerequisite, dependent on the nature of the work. Open to seniors only by special permission. Professor RIES. Day and hour to be arranged. *McGraw*.

**512. Seminary in Economic Geology.** Throughout the year. Credit two hours a term. Prerequisite, Geology 100 and 500. Professor RIES. Day and hour to be arranged. *McGraw*.

Open only to graduates.

#### GERMAN

**\*1. Course for Beginners: Oral Training, Grammar, Composition, Translation.** Repeated in second term. Credit six hours.

First term:

Sec. 1, daily 8. *Goldwin Smith* 183. Mr. HIEBLE.

Sec. 2, daily 9. *Goldwin Smith* 183. Dr. KUBLER.

Sec. 3, daily 10. *Goldwin Smith* 183. Professor POPE.

Second term:

Sec. 1, daily 8. *Goldwin Smith* 183. Mr. WOOD.

Sec. 2, daily 9. *Goldwin Smith* 183. Assistant Professor ANDREWS.

This course is equivalent to first and second year German of the entrance requirements (credit two units). It may be elected for three hours' credit by students who have entrance credit for only one unit of German (first year German).

**\*1a. Course for Beginners: Oral Training, Grammar, Composition, Translation.** Throughout the year. Credit six hours on completion of the course.

Sec. 1, M W F 9. *Goldwin Smith* 177. Mr. WOOD.

Sec. 2, T Th S 10. *Goldwin Smith* 177. Mr. HIEBLE.

Sec. 3, M W F 11. *Goldwin Smith* 183. Professor BOESCHE.

Sec. 4, T Th S 11. *Goldwin Smith* 183. Dr. KUBLER.

Sec. 5, M W F 12. *Goldwin Smith* 190. Assistant Professor ANDREWS.



This course is continuous throughout the year, and no credit is allowed for the first term alone. It is equivalent to first and second year German of the entrance requirements (credit two units). It may be elected in the second term by students who have had first year German (one unit).

**\*3. Intermediate Course. Oral Training, Grammar, Composition, Translation.** Repeated in second term. Credit five hours. Prerequisite, German 1, 1a, or entrance credit for two units of German (first and second year German).

First term:

M T W Th F 10. *Goldwin Smith* 190. Professor FAUST.

Second term:

M T W Th F 10. *Goldwin Smith* 183. Professor FAUST.

This course is equivalent to third year German of the entrance requirements.

**\*3a. Intermediate Course. Oral Training, Grammar, Composition, Translation.** Throughout the year. Credit three hours a term. Prerequisite, German 1, 1a, or entrance credit for two units of German (first and second year German). Dr. KUBLER. T Th S 12. *Goldwin Smith* 183.

This course is equivalent to third year German of the entrance requirements.

**\*4. Elementary German Composition and Conversation.** Throughout the year. Credit three hours a term. Open to those who are taking or have taken German 3. Sec. 1. M W F 12. *Goldwin Smith* 183. Professor POPE.

Sec. 2, M W F 11. Dr. KUBLER. *Goldwin Smith* 190.

Exercises conducted in German. Course 4 may be combined with courses 3 or 5.

**\*5. Rapid Reading Course.** Throughout the year. Credit three hours a term. Prerequisite, German 3, or its equivalent. First term, Assistant Professor ANDREWS; second term, Professor POPE. T Th S 11. *Goldwin Smith* 190.

Reading of modern German texts; oral exercises in German on the text; German grammar treated topically.

**\*7. Reading and Composition.** Second term, credit six hours. Prerequisite course 3, 3a, or the equivalent. Daily 12, *Goldwin Smith* 177. Mr. HIEBLE.

This course covers in part the work of courses 4 and 5. It is designed to succeed course 3 (first term).

**\*8. Scientific German.** Second term. Credit three hours. Prerequisite, German 1-3, or three years of German in High School. Assistant Professor ANDREWS. M W F 10. *Goldwin Smith* 190.

**10. Advanced German Composition and Conversation.** Throughout the year. Credit three hours a term. Prerequisite, German 1-5, or the equivalent. Professor BOESCHE. M W F 10. *Goldwin Smith* 177.

Exercises conducted in German. Theme-writing. This course is essential for the pursuit of advanced work in the department, and must be completed by students who desire to be recommended as teachers of German.

**11. Schiller's Dramas.** First term. Credit three hours. Prerequisite, German 1-5, or the equivalent. Assistant Professor ANDREWS. T Th S 10. *Goldwin Smith* 178.

**12. Schiller's Poems.** Second term. Credit three hours. Prerequisite, German 1-5, or the equivalent. Professor BOESCHE. T Th S 11. *Goldwin Smith* 177.

**13. Goethe's Life and Works.** First term. Credit three hours. Prerequisite, German 1-5, or the equivalent. Professor BOESCHE. T Th S 9. *Goldwin Smith* 177.

**14. Goethe's Faust, part I and selected portions of part II.** Second term. Credit three hours. Not open to freshmen. Prerequisite, German 1-5, or the equivalent. Professor FAUST. T Th S 9. *Goldwin Smith* 190.

**15. Survey of German Literature.** Lectures in English, collateral reading in German. Throughout the year. Credit three hours a term. Prerequisite, German 1-4, or the equivalent. Professor FAUST. M W F 9. *Goldwin Smith* 190.

[16. **Contemporary German Literature.** Throughout the year. Credit three hours a term. Prerequisite, German 1-5, or the equivalent. Professor FAUST. Not given in 1930-31.]

17. **Nineteenth Century Drama.** Kleist, Grillparzer, Hebbel, Hauptmann. Throughout the year. Credit three hours a term. Prerequisite, German 1-5, or the equivalent. Professor POPE. M W F 11. *Goldwin Smith* 177.

[18. **Lessing's Life and Works.** First term. Credit three hours. Prerequisite, German 1-5, or the equivalent. Professor POPE. Not given in 1930-31.]

[19. **Heine's Life and Works.** First term. Credit three hours. Prerequisite, German 1-5, or the equivalent. Not given in 1930-31.]

21. **Deutsche Kulturkunde.** Second term. Lectures in German and collateral reading. Credit three hours. Prerequisite, German 1-4, or the equivalent. Dr. KUBLER. M W F 3. *Goldwin Smith* 190.

The lectures will give a survey, with illustrations, of the life, customs, and civilization of Germany, present and past.

25. **Wagner's Life and Works.** Second term. Credit three hours. Prerequisite, German 1-5; otherwise only by special permission. Professor POPE. T Th S 10. *Goldwin Smith* 190.

Lectures on Wagner's theory of the music drama, the sources of his operas, his place in German literature, and his influence on modern culture. The texts of the principal operas will be read in class, and biweekly illustrative recitals will be given throughout the term, in conjunction with the Department of Music.

37. **Middle High German.** First term. Credit three hours. Prerequisite, German 1-5, 10, and six hours of literature. Assistant Professor ANDREWS. M W F 3. *Goldwin Smith* 178.

40. **Teachers' Course in Methods.** Second term. Credit two hours. Prerequisite, German 1-5, 10, and twelve hours of advanced work in German literature or philology. Professor FAUST. Th 3. *Goldwin Smith* 181.

42. **Gothic.** First term. Credit three hours. Professor BOESCHE. M W F 8. *Goldwin Smith* 188.

43. **Old High German.** Second term. Credit three hours. Prerequisite, German 37. Professor BOESCHE. M W F 8. *Goldwin Smith* 188.

48. **Principles of Germanic Philology.** Second term. Credit two hours. Prerequisite, German 42. Assistant Professor ANDREWS. T 3. *Goldwin Smith* 178.

49. **Seminary in German Literature.** First term. Credit two hours. For graduates only. Professor FAUST. Th 3-5. *Goldwin Smith* 181.

[50. **Seminary in German Literature.** Second term. Credit two hours. Professor POPE. Not given in 1930-31.]

52. **Seminary in German Philology.** Second term. Credit two hours. Professor BOESCHE. W 3. *Goldwin Smith* 188. Topics in Historical German Syntax.

## GOVERNMENT

\*1. **American Government.** Throughout the year. Credit three hours a term. First term is prerequisite to second. Open to sophomores, juniors, and seniors, and to a limited number of freshmen, particularly those planning to study law. Professor CUSHMAN. Lectures, T Th 9. Quiz hours to be arranged. *Goldwin Smith* A.

A major part of the year will be spent in studying the American national government, its historical development, organization, powers, and practical working. Attention will be given to the structure, functions, and methods of political parties. During part of the second term some of the more important problems of American state government will be dealt with.

\*2. **Comparative Government.** First term. Credit three hours. Open to sophomores. Mr. SHIPMAN. Lectures, M W F 10. *Goldwin Smith* 242.

Government and politics of England and Continental Europe, particularly France and Switzerland; tendencies in the new Europe; federal government.

**\*8. History of Political Thought.** Second term. Credit three hours. Open to sophomores. Professor CATLIN. M W F 10. *Goldwin Smith B.*  
An introductory course in political theory.

**9. Introduction to International Relations.** First term. Credit three hours. Open to sophomores. Assistant Professor BRIGGS. M W F 9. *Goldwin Smith 227.* A survey of nationalism, internationalism, imperialism, and the racial, political, economic, and geographical factors in modern international relations.

**10. Political Philosophy and Science.** Second term. Credit three hours. Open to qualified upperclassmen. Consult the instructor before registering. Professor CATLIN. F 2 and other hours to be arranged. *Goldwin Smith 227.* The meaning of a science of politics; the theory of authority, sovereignty, and liberty; toleration and censorship; aristocracy and representative government.

**11. Political Institutions.** Second term. Credit three hours. Professor CATLIN. M W F 11. *Goldwin Smith 242.*

A study of the development and structure of certain political institutions, and of their function in modern society.

**14. International Law.** Throughout the year. Credit three hours a term. Completion of first term is prerequisite to second. Open to qualified upperclassmen. Assistant Professor BRIGGS. M W F 12. *Goldwin Smith 142.*

The principles of international law and the development of international organization. The second term will be devoted to a study of international co-operation in the administration of justice, international regulation of commerce and industry, diplomatic protection and international claims, the pacific settlement of international disputes, hostile relations of states, and the law of neutrality.

Cases, readings, discussions.

**16. Contemporary American Foreign Policy.** Second term. Credit three hours. Open to upperclassmen and sophomores who have completed Government 9. Assistant Professor BRIGGS. M W F 9. *Goldwin Smith 142.*

The foreign relations of the United States during the 20th century; our Caribbean policy; the limitation of armaments; post-war relations with Europe, the League, the Permanent Court.

**20. Constitutional Law: The American Federal System.** First term. Credit three hours. Open to upperclassmen. Prerequisite, both terms of Government 1 or the consent of the instructor. Professor CUSHMAN. T Th S, 11. *Goldwin Smith 142.*

Judicial interpretation of the constitution: the nature of judicial review; separation of governmental powers; relations between state and national government; construction of national powers.

Government 20 and 21 are not designed primarily for pre-law students, but for those having a major interest in government, history, and economics. Attention is called to the fact that the Law School requires for graduation the regular Law School course in constitutional law.

**21. Constitutional Law: Fundamental Rights and Immunities.** Second term. Credit three hours. Open to upperclassmen. Prerequisite, Government 20 or the consent of the instructor. Professor CUSHMAN. T Th S 11. *Goldwin Smith 142.*

Privileges and immunities of citizenship; protection of civil and political rights; the obligation of contracts; due process of law and the equal protection of the law. Not designed primarily for pre-law students, but for those having a major interest in government, history, and economics. The Law School requires its students to complete the Law course in Constitutional Law before graduation.

**22. Seminary in Constitutional Problems.** Throughout the year. Credit four hours upon completion of the course. Open to graduate students and qualified seniors. Professor CUSHMAN. Hours to be arranged. *Goldwin Smith 248.*

23. **Seminary in Politics.** Second term. Credit two hours a term. Open to graduate students and qualified seniors. Professor CATLIN. Day and hour to be arranged.

24. **Seminary in International Law and International Organization.** Throughout the year. Credit two hours a term. Open to graduate students and qualified seniors. Assistant Professor BRIGGS. Hours to be arranged.

25. **Social, Legal and Political Ethics.** (See Philosophy 7a.)

26. **The State in Relation to Labor.** (See Economics 44.)

The attention of students whose upperclass group is History and Government is called to the following courses given in the Law School. They are open to Arts students only by permission of the Dean, and of the professor in charge of each course. For details see the Announcement of the Law School.

**Administrative Law and Public Officers.**

**Constitutional Law.**

**International Law.**

**Jurisprudence.**

**Labor Law.**

**Municipal Corporations.**

**Law of Public Service and Carriers.**

**Restraints on Business and Industry.**

**Taxation.**

## HISTORY

\*1. **Outlines of Ancient History.** Throughout the year. Credit six hours on completion of the course. Professor LAISTNER. M W 9 and an hour to be arranged. *Goldwin Smith* A.

Textbook, lectures, and collateral reading. First term. The Near Eastern countries and Greece to 405 B. C. Second term. Greek and Roman history, 405 B. C. to 330 A. D.

[3. **Greek History, 500 to 323 B. C.** Second term. Credit three hours. Prerequisite, History I or the equivalent. Professor LAISTNER. M W F 11. *Goldwin Smith* 236. Not given in 1930-31.]

4. **The Roman Empire, 30 B. C. to 180 A. D.** Second term. Credit three hours. Prerequisite, History I or 5. Professor LAISTNER. M W F 11. *Goldwin Smith* 236.

5. **The Roman Republic, 133 to 30 B. C.** First term. Credit three hours. Prerequisite, History I, or a satisfactory equivalent. Professor LAISTNER. M W F 11. *Goldwin Smith* 236.

Open to sophomores, juniors, and seniors. A detailed study of the political history of the period, with some reference to social and economic conditions.

6. **Greek and Roman Writers of History from Herodotus to Ammianus Marcellinus.** Throughout the year. Credit four hours on completion of the course. Prerequisites, History I, 3, 4, 5, or a satisfactory equivalent. Professor LAISTNER. M 2-4. *Goldwin Smith* 236.

Open to qualified upperclassmen and graduates with permission of the instructor. Lectures, discussion, and readings (in translation) of the historical writers of Greece and Rome.

[7. **The History of Education.** (Greek, Roman, and Early Medieval.) First term. Credit two hours. For upperclassmen and graduates only. Professor LAISTNER. T Th 10. *Boardman* C. Not given in 1930-31.]

[14. **Seminary in Ancient History.** Roman Historical Inscriptions. Throughout the year. Credit two hours a term. Professor LAISTNER. Open to graduates with a reading knowledge of Latin. Not given in 1930-31.]

[18. **Oriental History.** Throughout the year. Credit two hours a term. Professor SCHMIDT. A general survey of the history of Asia. Open only to juniors, seniors, and graduates. T Th 10. *Goldwin Smith* B. Not given in 1930-31.]

19. **Oriental History.** Throughout the year. Credit two hours. Professor SCHMIDT. A general survey of the history of Africa. Open only to juniors, seniors, and graduates. T Th 10. *Goldwin Smith B.*

21. **The Middle Ages.** First term. Credit three hours. Professor STEPHENSON. M W F 10. *Goldwin Smith C.*

The history of Christendom from the time of Constantine to the invention of typography.

23. **Medieval France.** First term. Credit two hours. Professor STEPHENSON. T Th 3. *Goldwin Smith 234.* Open to juniors and seniors.

25. **Studies in Medieval Towns.** Credit two hours. Open to graduates and qualified seniors. Professor STEPHENSON. S 10-12. *European History Seminary Room, Library.*

32. **The Age of the Renaissance and Reformation.** Second term. Credit three hours. Professor SMITH. M W F 10. *Goldwin Smith C.*

The political, social, and religious history of Christendom during this age of transition, with special attention to the beginnings of modern life and thought.

33. **History of Culture from the Renaissance to the Enlightenment.** Second term. Credit two hours. Open to juniors and seniors. Professor SMITH. T Th 3. *Goldwin Smith 234.*

The intellectual history of Western Europe during the sixteenth and seventeenth centuries, including the advance of science and learning, the religious changes following the Reformation, the struggle for freedom of conscience, the decline of superstition, and the growth of rationalism.

34. **Historical Method.** Second term. Credit two hours. Prerequisite, a reading knowledge of either French or German. Professor SMITH. S 10. *European History Seminary Room, Library.*

A study of the principles of historical investigation, criticism, and writing, a survey of the great modern historians, and an examination of recent works on the theory and practice of historiography.

[35. **Church History.** Throughout the year. Credit two hours. Open to graduates and qualified seniors. Prerequisite, a reading knowledge of Latin. Professor SMITH. Not given in 1930-31.]

[36. **History of Education (Late Medieval and Modern).** Second term. Credit two hours. Professor SMITH. T Th 10. *Goldwin Smith 234.* Not given in 1930-31.]

42. **History of Modern Europe.** Throughout the year. Credit three hours a term. Not open to freshmen. Professor BECKER. M W F 3. *Goldwin Smith C.*

A survey of European history from the beginning of the 17th century to 1914. Political, economic, and intellectual movements emphasized in proportion to their international or European importance.

43. **French Revolution.** First term. Credit two hours. Prerequisite, first term of History 42, or the special permission of the instructor. Professor BECKER. T Th 3. *Goldwin Smith 242.*

[44. **Napoleonic Era.** Prerequisite, first term of History 42, or the equivalent. Professor BECKER. T Th 3. *Goldwin Smith 242.* Not given in 1930-31.]

A study of the rise and fall of the Napoleonic Empire, 1795-1815.

\*61. **English History.** Throughout the year. Credit six hours on completion of the course; upperclassmen, four hours. Professor MARCHAM. M W 10 and an hour to be arranged. *Goldwin Smith A.* No credit given for the first term alone.

65a. **History of the English Constitution to 1485.** First term. Credit two hours. Mr. RAMSAY. T Th 10. *Goldwin Smith 221.* Not open to freshmen. A historical survey of the chief administrative and judicial institutions and of the law.

65b. **History of the English Constitution, 1485 to the Present.** Second term. Credit two hours. Professor MARCHAM. T Th 10. *Goldwin Smith* 227. Not open to freshmen.

A historical survey of the chief legislative, judicial, and administrative institutions.

67. **England from 1660 to the End of the 18th Century.** First term. Credit three hours. Professor MARCHAM. T Th S 9. *Goldwin Smith* 242. Not open to freshmen. A lecture course with readings in the literature of the period.

68. **England from Early 19th Century to the Present.** Second term. Credit three hours. Professor MARCHAM. T Th S 9. *Goldwin Smith* 242. Not open to freshmen. A lecture course with readings in the literature of the period.

69. **Seminary in Tudor and Stuart History.** First term. Credit two hours. Professor MARCHAM. Hours to be arranged. For graduates.

\*82. **American History, 1783-1850.** First term. Credit three hours. Open to sophomores, juniors, seniors. Professor WHITAKER. M W F 9. *Goldwin Smith* C. Apply at *Goldwin Smith* 234 on registration day for seat assignment.

Formation of new national government; European complications; domestic problems; rise of sectional parties. Textbook, lectures, and readings.

\*83. **American History, 1850-1914.** Second term. Credit three hours. Professor WHITAKER. Prerequisite, History 82. M W F 9. *Goldwin Smith* C.

Open to sophomores, juniors, seniors. Secession and civil war, reconstruction, recent political and constitutional history. Textbook, lectures, and readings.

[84. **Economic History of the United States to 1837.** First term. Credit three hours. Prerequisite, History 1, 61, 82, or 83, or Economics 1 or 2. Professor HULL. M W F 9. *Goldwin Smith* 234. Will be given in 1931-32.]

[85. **Economic History of the United States Since 1837.** Second term. Credit three hours. Prerequisite, History 84 or an accepted equivalent. Professor HULL. M W F 9. *Goldwin Smith* 234. Will be given in 1931-32.]

86. **American History, 1787-1848.** First term. Credit three hours. Sophomores, juniors, and seniors. Professor BRETZ. M W F 9. *Goldwin Smith* 234. Apply at *Goldwin Smith* 234 on registration day for seat assignment.

Not open to students who have had 82. Substantially the same as 82, but with emphasis on constitutional and political history.

87. **American History since 1848.** Second term. Credit three hours. Sophomores, juniors, and seniors. Professor BRETZ. M W F 9. *Goldwin Smith* 234. Apply at *Goldwin Smith* 234 on registration day for seat assignment.

Not open to students who have had 83. Substantially the same as 83, but with emphasis on constitutional and political history.

89. **American History, 1750-1848: The Settlement of the Middle West.** Throughout the year. Credit two hours a term. Prerequisite, History 82, 83, or the equivalent. Upperclassmen only. Professor BRETZ. T Th 9. *Goldwin Smith* 234. Apply at *Goldwin Smith* 234 on registration day for seat assignment.

[90. **Constitutional History of the Colonies.** First term. Credit three hours. Prerequisite, courses 82 and 83. Professor HULL. M W F 12. *Goldwin Smith* 234. Will be given in 1931-32.]

[91. **The American Revolution.** Second term. Credit three hours. Prerequisite, six hours of American History in college. Professor HULL. M W F 12. *Goldwin Smith* 234. Will be given in 1931-32.]

92. **Latin America since 1760.** Throughout the year. Credit two hours a term. Prerequisite, History 82, 83, or the equivalent. Professor WHITAKER. T Th 11. *Goldwin Smith* 242.

A survey of the colonial system, the revolutionary era and the rise of the independent republics, with emphasis on relations between Latin America and the United States.

97. **American History.** Investigation of topics in a selected field. First term. Credit two hours. For upperclassmen with majors in history. Professor WHIT-

AKER. M 2-4, or at an hour to be arranged. *Goldwin Smith* 244. Consult the instructor before registering.

98. **American History.** Investigation of topics in a selected field. Second term. Credit two hours. For upperclassmen with majors in history. Professor WHITAKER. M 2-4, or at an hour to be arranged. *Goldwin Smith* 244. Consult the instructor before registering.

99. **Seminary in American History.** Credit two hours a term. Professor BRETZ. Hours to be arranged. *Library, American History Room.* For graduates. First meeting, Monday, September 29, 4 p. m.

MATHEMATICS

*Examinations for the removal of conditions in courses 1 to 8 are held in September just before registration, and during examination week of each term. For further information regarding the time and place of these examinations, students should apply at White 20. No student may take more than one examination at any one of these three periods.*

*Students wishing to take any of the courses numbered above 15 are asked to meet in White 5 at 3:30 p. m. on the first day of instruction of the first term to confer with the teachers concerning these courses.*

*Of courses 1-8, not more than six (6) hours may be taken simultaneously without the special permission of the department.*

\*1. **Solid Geometry.** Repeated in second term. Credit three hours. First term, T Th S 10, M W F 8. Second term, M W F 10, T Th S 8.

\*2. **Advanced Algebra.** Repeated in second term. Credit three hours. M W F 9, T Th S 9.

\*2f. **Introduction to the Mathematics of Finance.** Repeated in second term. Credit three hours. T Th S 9.

\*3. **Plane Trigonometry.** Repeated in second term. Credit three hours. First term, M W F 10, T Th S 8. Second term, T Th S 10, M W F 8.

4a, 4b. **Analytic Geometry and Calculus.** Primarily for students in the College of Arts and Sciences. Prerequisites, Mathematics 1, 2, 3, or the equivalent.

\*4a. Daily except S, 11. Credit five hours. Repeated in second term.

4b. Daily except S, 11. Credit five hours. Continuation of 4a. Repeated in second term.

5a, 5b. **Analytic Geometry and Calculus.** Primarily for students in the College of Engineering. Prerequisites, Mathematics 1, 2, 3, or the equivalent.

\*5a. Daily except S. Credit five hours. Repeated in second term.

5b. Daily. Credit six hours. Continuation of course 5a. Repeated in second term.

5a, 7. **Analytic Geometry and Calculus.** Primarily for candidates for the degree of B. Chem. Prerequisites, Mathematics 1, 2, 3, or the equivalent. Daily except S.

\*5a. Credit five hours. Repeated in second term.

7. Credit five hours. Continuation of 5a. Second term only.

\*8. **Analytic Geometry and Calculus.** Primarily for students in the College of Architecture. Throughout the year. Credit three hours a term. Prerequisites, Mathematics 1, 2, 3, or the equivalent.

[\*15. **Elementary Course in Higher Mathematics.** Throughout the year. Credit three hours a term. Prerequisites, Mathematics 1, 2, 3, or the equivalent. Not given 1930-31; to be given in 1931-32.]

Students who have had the equivalent of any part of Mathematics 4a, 4b may receive only partial credit for the second term.

Intended for students who do not plan to take many courses in mathematics, but who wish to become acquainted with the principal ideas of the field. The object will be to make clear the fundamental aims, methods, and results of a number of subjects, rather than to develop the technique of any one. The course

will deal with the theory of numbers, vector analysis, groups; synthetic geometry, including some topics in projective, non-euclidean, and higher dimensional geometry; analytic geometry, calculus, famous problems of mathematics. Lectures assigned reading, and exercises.

**20. Teachers' Course.** Second term. Credit three hours. Prerequisite or parallel course, Mathematics 4b. Assistant Professor CRAIG. M W F 10. *White 5.*

A review of the methods of proof of important topics in algebra and geometry; an attempt to give perspective to elementary mathematics by showing the coordination between the parts. [Not to be given in 1931-32.]

**21. Theory of Numbers.** Second term. Credit three hours. Prerequisite, Mathematics 4b or the equivalent. Professor HURWITZ. T Th S 9. *White 6.*

Linear and quadratic congruences in the rational field; brief discussions of algebraic fields and of the analytic theory of numbers.

**23. Modern Algebra.** First term. Credit three hours. Prerequisite, Mathematics 4b, or the equivalent. Assistant Professor JONES. M W F 10. *White 2.*

Determinants, elimination, matrices, linear dependence, linear transformations, bilinear and quadratic forms, canonical forms, invariant factors and elementary divisors.

**25. Introduction to Linear Algebra.** Second term. Credit three hours. Prerequisite, Mathematics 23, or the equivalent. Assistant Professor JONES. M W F 10. *White 2.*

Fields, definitions of algebras, linear sets, difference algebras, nilpotent and semi-simple algebras, division algebras, and the structure of algebras.

**26. Theory of Groups.** First term. Credit three hours. Prerequisite, Mathematics 4b or the equivalent. Professor HURWITZ. T Th S 9. *White 6.*

The course will deal principally with finite groups; properties of such groups in general and of various special types; Sylow's theorem and its consequences.

**41. Elementary Differential Equations.** Repeated in second term. Credit three hours. Prerequisite, Mathematics 4b or the equivalent. T Th S 11. *White 2.*

**42. Advanced Calculus.** Throughout the year. Credit three hours a term. Prerequisite, Mathematics 4b or the equivalent. Professor GILLESPIE. M W F 11. *White 1.*

A study of the processes of the calculus, their meanings and applications. It is designed to furnish a necessary preparation for advanced work in analysis and applied mathematics.

**47. Theory of Ordinary Differential Equations.** Throughout the year. Credit three hours a term. Prerequisite, Mathematics 42 or its equivalent. Assistant Professor CRAIG. T Th S 11. *White 5.*

A presentation of some of the more important topics of the theory.

**61. Projective Geometry.** Throughout the year. Credit three hours a term. Prerequisite, Mathematics 4b or the equivalent. Professor SHARPE. M W F 9. *White 28.*

The elements of projective geometry treated synthetically.

**62. Advanced Analytic Geometry.** Throughout the year. Credit three hours a term. Prerequisite, Mathematics 4b or the equivalent. Professor CARVER. T Th S 10. *White 10.*

Projective geometry of one, two, and three dimensions treated by means of homogeneous coordinates.

**66. Algebraic Geometry of Space.** Throughout the year. Credit three hours a term. Professor SNYDER. T Th S 10. *White 24.*

Theory of surfaces, birational transformations, and line geometry. Familiarity with plane algebraic geometry is presupposed.

**70. Non-Euclidean Geometry.** Throughout the year. Credit three hours a term. Prerequisite, Mathematics 61 or the equivalent. Professor RANUM. M W F 9. *White 9.*

An introduction to the classical non-euclidean geometries, principally from the synthetic standpoint.



**83. Probability and Statistics.** First term. Credit three hours. Prerequisite, Mathematics 4b or the equivalent. Assistant Professor Roos. T Th S 10. *While 9.*

Theory of probability with applications to insurance and statistics. Correlation, curve fitting, sampling, and the theory of errors.

Attention is called also to courses 113 and 114 in Agricultural Economics.

**90. Mathematical Economics.** Second term. Credit three hours. Prerequisite, Mathematics 4b or the equivalent. Courses in economic theory would be desirable although not necessary. Assistant Professor Roos. T Th S 10. *While 9.*

**100. Problems, Research, and Informal Study.** For properly qualified students, members of the department will direct reading and research not necessarily associated with any course.

Problems of monopoly, competition and cooperation. Taxation, tariff and rent. Rates of exchange. Theory of interest and the equation of exchange. Utility and marginal utility. The theory of production. Some problems in economic dynamics.

The following courses are offered frequently: Theory of Equations; Infinite Series; Theory of Functions of a Real Variable and of a Complex Variable; Elliptic Functions; Integral Equations; Calculus of Variations; Calculus of Variations with Applications to Economics; Geometry of Hyperspace; Differential Geometry; Vector Analysis; Principles of Mechanics; Hydrodynamics; Elasticity; Fourier's Series; Potential Functions.

## MUSIC

*The courses offered by the Department of Music are designed to afford to all students having sufficient native ability the opportunity to study music as a part of the college course. The aim is to make musical training contribute to liberal culture.*

*Credit for Course 1 may be counted as part of the thirty hours which a student may elect outside of the College of Arts and Sciences, but may not be counted as part of the ninety hours required in the College. (See paragraph 1, p. 12.)*

*The University offers opportunities for choral training to students who have the ability to sing, through the Sage Chapel Choirs. The morning choir rehearses on Sundays at 10 and on Tuesday from 4:15 to 5:15. The afternoon choir rehearses on Sundays at 2:30 and on Monday evenings from 7:15 to 9. All rehearsals are held in the Chapel. Applications for admission to either choir should be made to Professor Weaver, at the office of the Music Department, 320 Wait Avenue, Sept. 22-24, 9 a. m.-12 m.*

*The University offers opportunities for instrumental ensemble work to students who play band and orchestral instruments, through the University Orchestra and the University Bands, which are trained and conducted by Mr. George L. Coleman. The University Orchestra rehearses in Sibley Dome on Monday evenings from 7:30-9:00 and on Thursday afternoons from 4:30-5:30. The University Bands rehearse in the Drill Hall on Monday, Wednesday, and Friday afternoons from 4:30-5:30. Applications for admission to the Orchestra and Bands should be made to Mr. Coleman, at the office of the Music Department, 320 Wait Avenue, Monday-Wednesday, September 22-24, 9 a. m.-12 m.*

*Applied Music. The Music Department offers pipe organ instruction under Assistant Professor Smith, and piano instruction under Assistant Professor Haigh, to a limited number of students whose courses admit of this type of work. Special fees are charged for this instruction and for the use of practice instruments; students who are interested should consult Professor Weaver at the office of the Music Department, 320 Wait Avenue, and should register with him at the beginning of the term.*

**1. Elementary.** Throughout the year. Credit four hours on completion of the course, no credit for first term alone. Primarily for freshmen, but open to all students showing sufficient aptitude to pursue the subject with profit. Professor WEAVER. T 2-4; Th 2-3:30. 320 Wait Ave.

Ear training; elementary sight reading; elementary theory, including the construction of scales; musical dictation and intervals; the elements of musical design and phraseology. The chief purpose of this course is to train the musical faculties of the student in order to furnish a basis for discriminating musical listening. The course or its equivalent is fundamental to all other courses in music.

**10. Harmony.** Throughout the year. Credit three hours a term. Prerequisite, Music I or the equivalent. Assistant Professor SMITH. M W F 9. *320 Wait Ave.*

The construction and interconnection of triads and their inversions; chords of the seventh and their inversions; chords of the ninth, chromatic harmony, suspensions and ornamental tones; harmonizing both bass and soprano melodies.

**12. Harmonic Analysis.** First term. Credit three hours. Prerequisite, Music 10. Assistant Professor SMITH. M W F 10. *320 Wait Ave.*

Analysis of the harmonic structure of selected compositions of various composers.

**14. Musical Form.** Second term. Credit three hours. Prerequisite, Music 10. Assistant Professor SMITH. M W F 10. *320 Wait Ave.*

A study of the typical musical forms as illustrated by selected compositions of various composers.

**16. Counterpoint.** Throughout the year. Credit two hours a term. Prerequisite, Music 10 or the equivalent. Assistant Professor SMITH. T Th 9. *320 Wait Ave.*

A course dealing with the principles of melodic combination.

**17. The Art of Music.** Throughout the year. Credit three hours a term. Open to upperclassmen. Professor WEAVER. M W F 11. *320 Wait Avenue.*

The fundamental acoustic, psychological, theoretical, aesthetic, and historical factors which enter into a rational understanding and enjoyment of the art.

**19. History of Pianoforte Literature.** Throughout the year. Credit 3 hours a term. Open to upperclassmen and graduates. Assistant Professor HAIGH. M W F 10, *320 Wait Avenue.*

An illustrated course giving a survey of literature from its beginnings to the present time. Although intended primarily for students who play the piano, technical proficiency on the instrument is not required as a prerequisite.

**21. History of Music.** Throughout the year. Credit two hours a term. Open to upperclassmen and graduates. Professor WEAVER. T Th 10. *320 Wait Avenue.*

A survey of the evolution of the art of music, with particular reference to questions of style and to the place of music in the artistic and social life of nations. First term, the music of primitive peoples, of antiquity, of the Middle Ages and up to approximately the year 1700. Second term, from approximately 1700 to the present day.

**22. Seminary in Musicology.** Throughout the year. Credit two hours a term. Primarily for graduates (and by permission to seniors) who have the requisite reading knowledge of one or more of the important foreign languages, a fair knowledge of musical theory, and some skill in practical music. Hours to be arranged. Professor KINKELDEY.

The work is intended to make the student acquainted with the accomplishments of the past and with modern methods and aims in all fields, scientific, aesthetic, and historical, of musical research and investigation. Special topics or fields of study will be selected for each term after consultation with the class.

## PHILOSOPHY

**\*1. Problems of Philosophy.** First term. Credit three hours. Professor THILLY, DR. PAINE, and Mr. ———. M W F 11. *Goldwin Smith 225.*

The fundamental problems of philosophy, together with a critical study of the most important types of philosophical theory.

\*2. **Logic.** Repeated in second term. Credit three hours. Assistant Professor SMART, Dr. PAINE, Mr. ROBINSON. First term: section I, T Th S 9; section II, M W F 12. Second term: section I, M W F 11; section II, T Th S 9. *Goldwin Smith 227.*

The general character of the thinking process, its laws of development, and the methods by which thought actually proceeds in the solution of problems.

\*2a. **Logic.** Second term. Credit three hours. Open only to freshmen. Dr. PAINE, Mr. ROBINSON. First section, M W F 12; Second section, T Th S 12. *Goldwin Smith 225.*

This course covers the same ground as course 2.

3. **Intermediate Logic.** Second term. Credit three hours. Open to juniors, seniors, and graduates. Assistant Professor SMART. M W F 10. *Goldwin Smith 227.* A somewhat detailed investigation of the reasoning processes, based principally on the works of Keynes and Joseph.

[4. **The Fine Arts, Their Philosophy and History in Outline.** First term. Credit three hours. Professor ———. T Th S 10. *Goldwin Smith A.* Not given in 1930-31.]

[4a. **The Renaissance.** Second term. Credit three hours. Professor ———. T Th S 10. *Goldwin Smith A.* Not given in 1930-31.]

5. **History of Philosophy.** Throughout the year. Credit three hours a term. Open to upperclassmen. Professor CUNNINGHAM. T Th S 9. *Goldwin Smith C.*

The history of philosophical speculation from its origin among the Greeks to the present time; the various philosophical systems in their relation to the science and general civilization of the ages to which they belong, and their application to social, political, and educational problems. Lectures, assigned readings, and reports.

\*6. **Moral Ideas and Practice.** Second term. Credit three hours. Professor THILLY. M W F 11. *Goldwin Smith 225.*

The development of moral ideas, ideals, and philosophies from early times to the present, with special emphasis on the great civilizations of the Occident.

7. **Ethics.** First term. Credit three hours. Professor THILLY. M W F 10. *Goldwin Smith 225.*

A study of the moral consciousness and of theories of right and wrong with a view to reaching a philosophy of life.

7a. **Social, Legal, and Political Ethics.** Second term. Credit three hours. Open only to juniors, seniors, and graduates. Professor THILLY. M W F 10. *Goldwin Smith 225.*

A study of the philosophical principles underlying our social, legal, and political conceptions.

8. **Plato and Aristotle.** First term. Credit three hours. The permission of the instructor is required. Mr. ROBINSON. M W F 9. *Goldwin Smith 220.* Assigned readings and discussion.

8a. **Stoics and Epicureans.** Second term. Credit three hours. The permission of the instructor is required. Mr. ROBINSON. M W F 12. *Goldwin Smith 220.*

Lectures, assigned readings, and discussion.

[9. **The Romantic Revolution in Modern Thought,** formerly Philosophical Ideas in 19th Century Literature. First term. Credit two hours. Primarily for juniors and seniors; open to sophomores by special permission. Professor CUNNINGHAM. T Th 11. *Goldwin Smith 225.*

A survey of the transition in European philosophy from the point of view of the eighteenth century to that of the nineteenth with special emphasis on the influence of the movement in respect to literary tendencies in England and America. Not given in 1930-31.]

12. **American Philosophy.** Throughout the year. Credit three hours a term. Acting Professor SMITH. T Th S 10. *Goldwin Smith 227.*

Generalized American attitudes toward life and thought as expressed in theology, law, politics, industry, education, and technical philosophy from colonial times to the present, with particular emphasis upon such recent systems as those of Royce, James, Santayana, and Dewey.

[13. **The Psychology of Religion.** First term. Credit three hours. Professor ———. M W F 9. *Goldwin Smith* 225. Not open to freshmen.

A psychological investigation of religious experience in its individual and social expressions in the different stages of historical development. Not given in 1930-31.]

[14. **The Philosophy of Religion.** Second term. Credit three hours. Professor ———. M 2-4, W 2. *Goldwin Smith* 225. Open to juniors, seniors, and graduates. Not given in 1930-31.

A critical examination of religion as expressed in the historical religions and the formulation of a constructive philosophy of religion.]

[14a. **Comparative Ethics.** First term. Credit three hours. Professor ———. M 2-4, W 2. *Goldwin Smith* 225. Open to juniors, seniors, and graduates. Not given in 1930-31.

A comparative study of the ethics of the great civilizations and religions, including the Egyptian, Babylonian, Chinese, Greek, Roman, Hindu, Zoroastrian, Jain, Buddhist, Hebrew, Christian, Islamic, and Sikh.]

[14b. **Comparative Religion.** Second term. Credit three hours. Professor ———. M 2-4, W 2. *Goldwin Smith* 225. Open to juniors, seniors, and graduates. Not given in 1930-31.

A comparative study of the great living religions, with special reference to their modern development.]

15. **The Philosophy of the Natural Sciences.** First term. Credit three hours. Open to juniors, seniors, and graduates. Assistant Professor SMART. M W F 11. *Goldwin Smith* 227. A study of the process of scientific reasoning, as illustrated by the historical development of important scientific conceptions, and a discussion of some of the more recent works on the philosophy of science.

[16. **The Philosophy of History.** Second term. Credit two hours. Professor ———. M W 11. *Goldwin Smith* 221. Open to juniors, seniors, and graduates. Not given in 1930-31.

A study of the logic and methodology of the historical sciences and of the metaphysical implications of history.]

26. **The Ethics of Modern Utilitarianism.** Throughout the year. Credit three hours a term. Open to qualified seniors and graduates. Professor THILLY. Th 3-5:30. *Goldwin Smith* 220.

27. **Readings in Greek Philosophy.** Throughout the year. Credit two hours a term. Mr. ROBINSON. Time and place to be arranged.

Reading and interpretation of the Greek text of Plato's Republic, or of some other Greek philosophical text.

28. **Philosophy of Value.** Throughout the year. Credit three hours a term. For seniors and graduates. Acting Professor SMITH. T Th S 11. *Goldwin Smith* 221.

A critical analysis of the main lines of Western value philosophy with primary reference to ethics and major emphasis upon contemporary material. Lectures and discussions.

[29. **Modern Idealistic Theory of Ethics.** Throughout the year. Credit three hours a term. Primarily for graduates. Professor THILLY. Th 3-5:30. *Goldwin Smith* 220. Not given in 1930-31.]

30. **Empiricism.** First term. Credit three hours. Primarily for graduates. Assistant Professor SMART. T Th S 11. *Goldwin Smith* 220.

A study of the epistemological writings of Locke and Hume.

31. **Early Rationalism: Spinoza and Leibniz.** Second term. Credit three hours. Primarily for graduates. Assistant Professor SMART. T Th S 11. *Goldwin Smith* 220.

A critical study of early Rationalism, with special reference to the divergent tendencies represented by Spinoza and Leibniz.

[32. **The Critical Philosophy of Kant.** Throughout the year. Credit three hours. For graduates only. Professor CUNNINGHAM. M 3. *Goldwin Smith* 220.

A study of the *Critique of Pure Reason* and of the *Critique of Judgment*, with frequent reference to standard commentaries and to more recent interpretations. Not given in 1930-31.]

33. **The Philosophy of Hegel.** Throughout the year. Credit two hours. For graduates only. *Goldwin Smith* 220. Professor CUNNINGHAM. Hours to be arranged.

A critical study of the philosophy of Hegel, with special emphasis on the *Phenomenology*, the *Logic*, and the *Philosophy of Mind*.

34. **Contemporary Philosophy.** Throughout the year. Credit two hours a term. Prerequisite, Philosophy 5. Professor CUNNINGHAM. W F 11. *Goldwin Smith* 220.

A critical survey of contemporary tendencies with special emphasis on more recent representatives. Lectures, reports, and discussions.

35. **Seminary on Eighteenth Century Moralists.** Throughout the year. Open only to graduates. Acting Professor SMITH. T 3, or hours to be arranged. *Goldwin Smith* 220.

Subject: Major English moralists from Hobbes to Paley.

37. **Seminary in Ethics.** Throughout the year. Credit two hours a term. Open only to graduates. Professor THILLY. Hours to be arranged. *Goldwin Smith* 220.

Moral philosophy in its relations to economics, politics, and law.

39. **Seminary in the History of Philosophy and Metaphysics.** Throughout the year. Credit two hours a term. For graduate students only. Professor CUNNINGHAM. M 3, or hours to be arranged. *Goldwin Smith* 220.

Topic for the year 1930-31: Mind and Meaning.

40. **Seminary in Logic.** Throughout the year. For graduates only. Assistant Professor SMART. F 2, or hours to be arranged. *Goldwin Smith* 220. The subject for the year 1930-31 will be A Study of some Classical Logical Theories.

[42. **Seminary in the Philosophy of Religion.** Throughout the year. For graduates only. Professor ———. W 4-6. *Goldwin Smith* 220. Not given in 1930-31.]

## PHYSICAL EDUCATION

*The following courses are designed, not only to train teachers and directors of physical education in public schools and colleges, but also to provide a general course of study which may have both a practical and a broad educational appeal. A four-year undergraduate course has been outlined to meet the requirements for the New York State Teacher's Certificate in Physical Education, copies of which may be obtained upon application.*

20. **History of Physical Education.** First term. Credit two hours. Professor YOUNG. T Th 8. *Goldwin Smith* 164.

For juniors and seniors. The distinguishing characteristics of various peoples, as to habits of living and forms of physical activity and the part these have played in their national development.

21. **Modern Developments in Physical Education.** Second term. Credit two hours. Professor YOUNG. T Th 8. *Goldwin Smith* 164.

A continuation of course 20, dealing with the history and various aspects of the physical education movement in Europe and present-day America.

22. **Theory of Physical Education and Methods of Teaching.** Second term. Credit two hours. Professor JORDAN. M W 11. *Goldwin Smith* 248.

For juniors and seniors. The objects and scope of physical education; the principles and technique involved in its teaching, arrangement, classification, and progression of exercises.

23. **Organization and Administration of Play, Athletics, and Gymnastics.** Second term. Credit three hours. Professor YOUNG and instructors. M W F 8. *Goldwin Smith 234.*

For juniors and seniors. The social and educational value of play, with special emphasis upon the management and supervision of athletic sports, recreation centers, scouting activities, etc.

24. **School Hygiene.** First term. Credit two hours. Professor YOUNG. T Th 12. *Goldwin Smith 242.*

For juniors and seniors. Sanitary aspects of school environment: methods and scope of health instruction and supervision.

25. **First Aid.** Repeated in second term. Credit one hour. Dr. SHOWACRE. See Hygiene 4.

26. **Health Supervision of School Children.** Second term. Credit two hours. Dr. GOULD. See Hygiene 3.

27. **Kinesiology, Physiology, and Prescription of Exercise.** First term. Credit three hours. Dr. GOULD. M W F 12. *Goldwin Smith 234.*

For juniors and seniors. The anatomical mechanics of movement; the value of various forms of therapeutic gymnastics, corrective appliances, and massage; the effects of exercise upon the heart and blood vessels.

28. **Physical Measurements.** Second term. Credit one hour. Professor YOUNG. F 12. *Goldwin Smith 248.*

Measurements of school children; their practical application to problems of growth and development, together with tests of physical ability and proficiency.

## PHYSICS

*Students who wish to continue the study of Physics after completing one of the introductory courses are advised to consult with some member of the Physics Faculty, who will be glad to advise them regarding the courses best suited to their needs or interests. Those who desire to follow Physics as a profession, either in education or in research or testing laboratories, should also consult with the department concerning the opportunities in the field.*

*In general, those who intend to specialize in Physics should take Courses 60, 61, and 62, which are prerequisite to more advanced work. For those who do not wish to specialize, but who have a general interest in the subject, elections from Courses 55, 60, 61, 62, 611, 621 and 622 are suggested.*

*Students expecting to elect Physics for their upperclass group are advised to complete Mathematics 4 or its equivalent before the beginning of the junior year.*

*Entrance credit in Physics does not carry with it University credit in Courses 3 and 4 or 6. If a student entering the University from a preparatory school desires credit for these Courses, he must pass an examination set by the Department of Physics. This examination is held in Ithaca on the same day in September as the entrance examination. University credit that is obtained by passing this examination does not carry with it entrance credit in Physics.*

*Examinations for those who were unavoidably absent from either term examination in courses 3 to 6, and for those who have conditions to make up, will be held on Monday, September 22, 1930, at 10 a. m. in Rockefeller A. Similar examinations in connection with Courses 28 to 62 will be held in Rockefeller A at 2 p. m. on the same day. Students expecting to take any of these examinations should notify the department not later than September 15, 1930.*

## GENERAL COURSES

\*3. **Introductory Experimental Physics.** First term. Credit three hours. Lectures. Professor MERRITT. W F 9 or W F 11. *Rockefeller A.* Laboratory. MESSRS. GILBERT, HAZLEWOOD, HIRSH, MANN, MINGINS, SCHOEFFLE, SIMPSON. THEN, TRAWICK, and WILBER. One two-hour period a week to be arranged, *Rockefeller 220.*

Demonstration lectures and laboratory work covering properties of matter, sound, and light.

**\*4. Introductory Experimental Physics.** Second term. Credit three hours. Lectures. Assistant Professor HOWE. W F 9 or W F 11. *Rockefeller A.* Laboratory staff as in course 3. One two-hour period a week to be arranged. *Rockefeller 220.*

Demonstration lectures and laboratory work covering heat, magnetism, and electricity.

Courses 3 and 4 form a continuous first course. Course 4 may be taken before course 3 if this sequence is preferred.

**\*6. Introductory Physics.** Repeated in second term. Credit six hours. Prerequisite, equivalent of Mathematics 1-3; entrance physics desirable. Assistant Professor COLLINS and Messrs. CARR, FORD, MARCHANT, and MUELLER.

Lectures, T Th 12. *Rockefeller A.* Four recitations to be arranged. Required of students in Engineering.

**\*7. General Physics.** First term. Credit three hours. Prerequisite, entrance physics. Assistant Professor HOWE and Mr. \_\_\_\_\_. One demonstration lecture, and two recitations, M W F 9 or 11. *Rockefeller B.*

Lecture and classroom work covering properties of matter, sound, and light. Must be taken with Course 7A unless permission to omit the latter course is obtained by the student from the professor in charge.

The eight hours credit given by Courses 7, 7A, 8, and 8A together do not meet the requirements of laboratory work for students entering the study of medicine. Pre-medical students should elect Courses 3, 4, and 55.

**\*7A. Physical Experiments.** First term. Credit one hour. One two-hour laboratory period a week to be arranged. *Rockefeller 220.*

Laboratory work to accompany Course 7.

**\*8. General Physics.** Second term. Credit three hours. Prerequisite, entrance physics.

A continuation of Course 7, covering magnetism, electricity, and heat. Course 8 may be taken before Course 7 if this sequence is preferred.

Must be taken with Course 8A unless permission to omit the latter course is obtained by the student from the professor in charge.

**\*8A. Physical Experiments.** Second term. Credit one hour. One two-hour laboratory period a week.

Laboratory work to accompany Course 8.

**28. General Physics.** First term. Credit two hours. Prerequisite, Physics 6 and Mathematics 5a, 5b. Assistant Professor GRANTHAM, and Messrs. CRAFTS, CUYKENDALL, GOLDSMITH, SAMUELS, TEEPLE, and WEBB. Two recitations a week to be arranged. *Rockefeller.*

Classroom work on theory and problems covering selected topics in heat, light, and wave-motion. Required of candidates for the degree of M. E. or E. E.

**29. General Physics.** Second term. Credit two hours. Prerequisite, Physics 28. Staff as in Course 28. Day and hour to be arranged. *Rockefeller.*

Continuation of Physics 28. Selected topics in electricity and magnetism. Required of candidates for the degree of M.E. or E.E.

**31. General Physics.** Second term. Credit two hours. Prerequisite, Physics 3 and 4 and Mathematics 5a and 7. Assistant Professor GRANTHAM and Mr. NELSON. *Rockefeller.* Two recitations, to be arranged.

Theory and problems covering selected topics in mechanics, wave-motion, and light. Required of candidates for B. Chem.

**34a. Physical Measurements.** Either term. Credit two hours. Prerequisites, Physics 6 and Mathematics 5a and 5b. Physics 28 must accompany or precede this course. Assistant Professor GRANTHAM and Messrs. CRAFTS, CUYKENDALL, GOLDSMITH, NELSON, SAMUELS, and TEEPLE. One laboratory period a week to be arranged.

Physical measurements in properties of matter, mechanics, heat, light, and sound; the adjustment and use of instruments of precision. Required of candidates for M.E., E.E., and B. Chem.

34b. **Physical Measurements.** Either term. Credit two hours. Prerequisite, Physics 34a, of which this course is a continuation. Physics 29 must accompany or precede this course.

Physical measurements in magnetism and electricity.

55. **Introductory Physical Experiments.** Either term. Credit three hours. Prerequisite, Physics 3 and 4 or the equivalent. Professor GIBBS and Mr. BARNES. T Th 2-4:30, W F 8-10:30, W F 2-4:30. *Rockefeller 352.*

Two laboratory periods a week, with reports. Fundamental experiments covering properties of matter, heat, light, sound, magnetism, and electricity. Primarily intended for students preparing for Medicine.

60. **Physical Experiments.** Either term or throughout the year. Credit three hours a term. Prerequisite, Physics 3 and 4 and Mathematics 3. Selected experiments available for those who have also had Mathematics 4. Desirable to consult instructor before registering. Professor GIBBS and Mr. WOOD. Three hours of laboratory work T and Th, between 8 and 1. *Rockefeller 352.*

Laboratory work in mechanics, properties of matter, heat, sound, light, electricity, and magnetism. Experiments selected to meet the needs of the individual student. For those with little training in Physics and Mathematics, emphasis will be placed upon the illustration of physical principles. For those qualified, opportunity will be given to study methods of measurement, sources of error, the adjustment and use of instruments of precision, and graphical methods of interpreting results. Primarily for students in Arts and Sciences. Suitable to accompany Physics 61 or 62 or both, but may be taken separately.

61. **General Physics.** First term. Credit three hours. Prerequisite, Physics 4 or the equivalent. Professor GIBBS. M W F 8. *Rockefeller 107.*

Primarily for students in Arts and Sciences. Classroom work covering heat, magnetism, and electricity.

Physics 61 and 62 are designed to meet the needs of students who desire a somewhat detailed survey of the fundamentals of physics. Physics 60 may suitably accompany either or both of these courses. A course in Trigonometry should precede or accompany Courses 61 and 62.

62. **General Physics.** Second term. Credit three hours. Prerequisite, Physics 3 or the equivalent. Professor GIBBS. M W F 8. *Rockefeller 107.*

Primarily for students in Arts and Sciences. Classroom work covering properties of matter, sound, and light.

Course 62 may be taken either before or after Course 61.

[91. **The Teaching of Physics in Secondary Schools.** Second term. Credit two hours. Prerequisite, Physics 60 and 61 or 62. Mr. ———. Not given in 1930-31.]

105. **Advanced Laboratory Practice.** First term. Credit three hours. Prerequisite, Physics 60, 61, and 62 and Mathematics 4, or the equivalent. Assistant Professor MURDOCK and Mr. SMITH. Lectures, Th 2. Laboratory, T W F afternoons. *Rockefeller 324.*

One lecture and two laboratory periods a week. Considerable time will be spent on each of a small number of experiments selected to meet the requirements of the individual student. The lectures will include an introductory discussion of the theory of measurements and its application to laboratory problems.

106. **Advanced Laboratory Practice.** First and second term. Credit one to three hours, depending on the amount of work done. Prerequisite, ordinarily the same as Physics 105. Admission after consultation with the instructor. First term, Assistant Professor MURDOCK; second term, Assistant Professor BARTON; in certain fields of experimentation other members of the department will co-operate in directing the work. T W Th F afternoons as arranged. *Rockefeller 324.*

Individual experimental work making use of the apparatus and equipment of Physics 105. Frequently single experiments which are parts of other advanced laboratory courses, such as Physics 573, 593, 595, 613, and 626 may be performed as part of this course.



**111. Mechanics.** First term. Credit three hours. Prerequisite, Physics 60 and 62 and Mathematics 4, or the equivalent. Assistant Professor MURDOCK. M W F 8. *Rockefeller*. This course is given in alternate years.

An introductory study of analytical mechanics based on Jean's "Theoretical Mechanics."

**112. Properties of Matter.** Second term. Credit three hours. Prerequisite, Physics 60, 61, and 62 and Mathematics 4, or the equivalent. Assistant Professor MURDOCK. M W F 8. *Rockefeller*. This course is given in alternate years.

An introductory study of thermodynamics and the kinetic theory; properties of fluids, surface tension, viscosity, elasticity.

**120. Electricity and Magnetism.** Throughout the year. Credit three hours a term. Prerequisite, Physics 60, 61, and 62 and Mathematics 4, or the equivalent. Assistant Professor MURDOCK. T Th S 10. This course is given in alternate years. Not given in 1930-31.]

**130. Light.** Second term. Credit three hours. Prerequisite, Physics 60 and 62 and Mathematics 4, or the equivalent. Assistant Professor COLLINS. M W F 8. This course is given in alternate years. Not given in 1930-31.]

**160. Wave Motion and Sound.** First term. Credit three hours. Prerequisite, Physics 60 and 62 and Mathematics 4, or the equivalent. Assistant Professor COLLINS. M W F 8. This course is given in alternate years. Not given in 1930-31.]

**170. Introduction to Modern Physical Theories.** Throughout the year. Credit three hours a term. Prerequisite, Physics 120 or 130, or the equivalent. Professor RICHTMYER. T Th S 10. *Rockefeller C*. This course is given in alternate years.

Early theories; a brief survey of the electromagnetic theory, photoelectricity, radiation and the quantum theory, X-rays, structure of matter, radioactivity, wave mechanics.

Intended for seniors specializing in physics and for first- or second-year graduate students.

**211. Mechanics.** Throughout the year. Credit three hours a term. Prerequisite, Physics 111 or the equivalent. Primarily for graduates. Professor KENNARD. T Th S 8. This course is given in alternate years. Not given in 1930-31.]

**220. Electricity and Magnetism.** Throughout the year. Credit three hours a term. Prerequisite, Physics 120 or the equivalent. Primarily for graduates. Professor KENNARD. T Th S 8. This course is given in alternate years.

Electric and magnetic fields and electromagnetic waves, omitting developments in terms of special mathematical functions; the electron; relativity.

**230. Physical Optics.** First term. Credit three hours. Prerequisite, Physics 130 or the equivalent. Primarily for graduates. Assistant Professor HOWE. T Th S 11. This course is given in alternate years.

The wave theory of interference, diffraction, and polarization; the electromagnetic theory of dispersion and absorption; magneto-optics.

**240. Applications of Thermodynamics in Physics.** Second term. Credit two hours. Professor MERRITT. This course is given in alternate years. Not given in 1930-31.]

**300. Physics Seminary.** Throughout the year. Credit one hour a term. For seniors and graduates. Professor MERRITT. M 3:15. *Rockefeller C*.

#### SPECIAL TOPIC COURSES

**415. Special Topics in Physics.** For graduates. Reading in any branch of physics, experimental or theoretical, under the guidance of some member of the staff, supplemented by reports and regular conferences. In theory, possible topics among many are,—elasticity, fluid motion, theory of sound, the electromagnetic field, or a narrower field including its recent developments may be chosen.

417. **Special Topics in Recent Theoretical Physics.** Second term. Credit two hours. Professor KENNARD. For graduates. W F 12.

The history and the leading ideas of relativity, quantum mechanics, and the theory of radiation.

[425. **Aerodynamics and the Mechanics of Flight.** Second term. Credit one hour. Prerequisites, Physics 34 or 60. Professor BEDELL. Not given in 1930-31.]

460. **Kinetic Theory of Matter.** First term. Credit three hours. Professor KENNARD. M W F 10.

An introduction to the kinetic theory of gases, the electron theory of matter, and statistical physics in general, based on Loeb's "Kinetic Theory of Gases."

[473. **Quantum Theory.** First term. Credit three hours. Professor KENNARD. Primarily for graduates. Not given in 1930-31.]

[480. **Quantum Mechanics.** Second term. Credit three hours. Professor KENNARD. Primarily for graduates. Not given in 1930-31.]

525. **Thermodynamics.** Throughout the year. Credit three hours. Prerequisite, Mathematics 41. Mathematics 42 is recommended. Professor TREVOR. Day and hour to be arranged.

[571. **Spectroscopy and Luminescence.** Throughout the year. Credit two hours a term. Prerequisite, Physics 130 or its equivalent. Professor GIBBS.

Lectures and assigned readings. This course is given in alternate years. Not given in 1930-31.]

573. **Spectroscopy and Luminescence.** First term. Credit variable. Prerequisite, Physics 105 and 130, or the equivalent. Professor GIBBS and Mr. SHAW. Day and hour to be arranged. *Rockefeller.*

Laboratory work for a limited number of students.

581. **Atomic Structure.** Second term. Credit three hours. For graduate students only. Professor GIBBS. M W F 10. Given in alternate years.

The development of modern atomic theory and its application in the explanation of spectral series, resonance, and ionizing potentials, and fine structure; the structure of the nucleus as revealed by radioactive and isotopic phenomena and the effects of high speed bombardment.

[591. **X-Rays and the Structure of Matter.** Throughout the year. Credit three hours, first term; two hours, second term. For graduate students only. Professor RICHTMYER. This course is given in alternate years. Not given in 1930-31.]

[593. **X-Rays.** Second term. Credit variable. Prerequisite, first term's work in Physics 120 or 591. Professor RICHTMYER. Laboratory work for a limited number of students. This course is given in alternate years. Not given in 1930-31.]

595. **Diffraction of X-Rays by Crystals.** Second term. Credit three hours. Prerequisite, Physics 34 or 60. Lectures and laboratory work for a limited number of students. Assistant Professor MURDOCK.

Laboratory practice in the various methods of investigating the structure of crystals by X-rays; lectures on the theory of diffraction and the interpretation of the experimental data.

[611. **Electric Waves and Oscillations.** First term. Credit one hour. Prerequisite, Introductory Physics. Professor MERRITT. M 12.

Experimental lectures. Given in alternate years. Not given in 1930-31.]

[612. **Special Topics in Recent Experimental Physics.** Second term. Prerequisite, Introductory Physics. Professor GIBBS, and Assistant Professors BARTON and COLLINS. M 12. Alternated with Physics 622. Not given in 1930-31.]

613. **Electric Waves and Oscillations.** Second term. Laboratory. Credit one to four hours. Prerequisite, Physics 60 and 611, or the equivalent. Professor MERRITT and Mr. WEBB. Day and hour to be arranged.

**621. Electrical Conduction in Gases.** First term. Credit one hour. Prerequisite, Introductory Physics. Professor MERRITT. M 12. *Rockefeller B.* Experimental lectures. Given in alternate years.

**622. Special Topics in Recent Experimental Physics.** Second term. Credit one hour. Prerequisite, Introductory Physics. Professor RICHTMYER and Assistant Professor MURDOCK and ————. Experimental lectures. Alternates with Physics 612.

**623. Electrical Conduction in Gases.** First term. Credit three hours. Prerequisite, Physics 120 or the equivalent. Assistant Professor BARTON. M W F 9. Theory of ionization in gases; electron impacts; photo-ionization; recombination; thermionic and photo-electric emission; motion of electrons and ions.

**[625. Electrical Conduction in Gases.** First term. Credit three hours. Assistant Professor BARTON. A continuation of Physics 623 with which this course alternates. Not given in 1930-31.]

**626. Electrical Conduction in Gases.** Second term. Credit two hours. Prerequisite, Physics 60 or the equivalent. Assistant Professor BARTON. W F afternoons. *Rockefeller 323.*

Laboratory work covering the production and measurement of high vacua, thermionic and ionization currents, discharges in gases, and related problems.

**633. Alternating Currents.** First term. Credit two hours. Prerequisite, Physics 34 or the equivalent. Professor BEDELL. T Th 11. *Rockefeller 155.*

A study of the underlying principles of alternating currents; the development of graphical methods of analysis as a basis for testing and for the solution of practical problems.

**634. Electrical Laboratory.** Either term, or throughout the year. Credit variable. Prerequisite, Physics 34 or the equivalent. Professor BEDELL and Mr. RICHARDS. Hours as arranged. *Rockefeller.*

Direct and alternating current measurement, and the investigation of special problems. The character of the work will be varied to meet individual needs.

**636. Advanced Alternating Currents.** Second term. Credit two hours. Prerequisite, Physics 633. Professor BEDELL. T Th 11. *Rockefeller 155.*

Discussion of the theory and measurement of alternating currents. A seminary for graduates.

**637. Theses in Applied Electricity.** Second term or throughout the year. Credit two to eight hours a term. Prerequisite, Physics 34 or the equivalent. Professor BEDELL. Day and hour to be arranged. *Rockefeller.*

## PSYCHOLOGY

*Students who wish to take Course 1 or 2 should go, on one of the registration days, to Morrill Hall, middle entrance, third floor, for assignment to seats and sections.*

**\*1. Elementary Psychology.** Repeated in second term. Credit three hours. Lectures, *Goldwin Smith C.* First term: T Th 11, Professor WELD; M W 12, Assistant Professor JENKINS. Second term: M W 12, Dr. KREEZER. Recitations, one hour a week, to be arranged. Dr. FELDMAN and Mr. FOX.

**2. General Psychology: Problems and Points of View.** Second term. Credit three hours. Prerequisite, Psychology 1. Professor WELD, Dr. FELDMAN, and Mr. FOX. Lectures, T Th 11. *Goldwin Smith C.* Recitations, one hour a week, to be arranged.

**3. Introductory Laboratory.** Repeated in second term. Credit three hours. Prerequisite, Psychology 1. Assistant Professor JENKINS, Dr. FELDMAN, and Dr. KREEZER. M W F 2-4. *Morrill, Psychological Laboratory.*

**4. Advanced Laboratory: The Psychophysical and Correlational Methods.** Second term. Credit three hours. Prerequisite, Psychology 3. Assistant Professor JENKINS. M W F 2-4. *Morrill, Psychological Laboratory.*

**5. Perception.** First term. Credit three hours. Prerequisite, Psychology 2 or 3. Dr. FELDMAN. M W F 9. *Morrill 42.*

6. **Memory, Skill, and Work.** Second term. Credit three hours. Prerequisite, Psychology 2 or 3. Dr. FELDMAN. M W F 9. *Morrill 42.*

7. **Reading of German Psychology.** Second term. Credit three hours. Prerequisite, consent of the instructor. Hours to be arranged. Dr. FELDMAN. *Morrill, Psychological Laboratory.*

8. **Technique of Experimentation.** Second term. Credit two hours. Prerequisite, Psychology 3. Dr. KREEZER. T Th 2. *Morrill, Psychological Laboratory.*

9. **Psychological Problems.** Repeated in second term. Credit three hours. Prerequisite, consent of the instructors. Professor WELD and Assistant Professor JENKINS. F 2 and other times to be arranged. *Morrill, Psychological Laboratory.*

10. **Social Psychology.** Second term. Credit three hours. Prerequisite, senior standing. Professor OGDEN. M W F 10. *Morrill.*

11. **Physiological Psychology.** First term. Credit three hours. Prerequisite, Psychology 1 and consent of the instructor. Assistant Professor JENKINS. M W F 10. *Morrill 42.*

12. **Legal Psychology.** Psychological problems of evidence and responsibility. Second term. Credit three hours. Prerequisite, Psychology 1. Intended for juniors preparing for the law. Professor WELD. M W F 11. *Boardman Hall C.*

13. **History of Psychology.** Derivation of current schools. First term. Credit three hours. Prerequisite, senior standing and consent of the instructor. Professor OGDEN. M W F 10. *Morrill 41.*

## PUBLIC SPEAKING

\*1. **Public Speaking.** Repeated in second term. Credit three hours. Not open to freshmen. Assistant Professors MUCHMORE, WICHELSNS, and WAGNER, and Messrs. THOMAS and HOWELL. First term: M W F 9, 10, 11, 12; T Th S 9, 10, 11. Second term: M W F 9, 10, 11, 12; T Th S 9, 10.

Planned to give the fundamentals of speech preparation and to develop simple and direct speaking. Required readings, conferences, and drills.

Students must enroll on registration days at *Goldwin Smith 21.*

\*2. **Public Speaking.** Second term. Credit three hours. Prerequisite, Public Speaking 1 (one term) or 1a. Assistant Professors MUCHMORE, WICHELSNS, and WAGNER. M W F 9, 10, 11, 12.

A continuation of course 1, with attention to the problem of persuasion.

The '86 Memorial Prize is awarded in connection with this course. See the University pamphlet, *Prize Competitions.*

Students must enroll on registration days at *Goldwin Smith 21.*

\*8. **Voice Training and Phonetics.** Repeated in second term. Credit two hours. Open by consent of the instructor. Mr. THOMAS. First term: T Th S 10. *Goldwin Smith 26.* Second term: M W F 10. *Goldwin Smith 26.*

An elementary course in the principles of voice production and English pronunciation for the improvement of the speaking voice.

Foreign students and students with special problems are advised to take this course before taking course 1.

10. **Oral Reading.** Repeated in second term. Credit three hours. Not open to freshmen. Mr. THOMAS. M W F 9. *Goldwin Smith 26.*

Training in expressive reading based on the interpretative study of prose and poetry.

Students must enroll on registration days at *Goldwin Smith 21.*

12. **Argumentation.** First term. Credit three hours. Prerequisite, Public Speaking 1 (one term) or 1a. Assistant Professor WICHELSNS. M W F 11. *Goldwin Smith 21.* Assistant Professor WAGNER. M W F 12. *Goldwin Smith 21.*

Training in reasoning, and in the composition of argument both written and spoken; practice in debate.

This course is recommended by the department to students preparing for the law.

Students must enroll on registration days at *Goldwin Smith 21*.

**13. Advanced Argumentation.** Second term. Credit two or three hours, as arranged. Prerequisite, Public Speaking 12 and the consent of the instructor. Assistant Professor WAGNER. M W F 12. *Goldwin Smith 21*.

**14. Public Opinion and the Method of Argument.** Second term. Credit three hours. Open by consent of the instructor to upperclassmen. Assistant Professor WICHELNS. T 11, Th 11-1. *Goldwin Smith 26*.

Public opinion and its formation studied with reference to the modern theory and practice of public address.

**15. Forms of Address.** First term. Credit three hours. Prerequisite, two terms of practice in public speaking (in courses 1, 1a, 2, or 12) and the consent of the instructor. Assistant Professor MUCHMORE. M W F 10. *Goldwin Smith 26*.

Training in the composition and delivery of various types of public address; reading of representative speeches.

**16. Advanced Public Speaking.** Second term. Credit three hours. Prerequisite, two terms of practice in public speaking (in courses 1, 1a, 2, or 12) and the consent of the instructor. Assistant Professor MUCHMORE. M W F 10. *Goldwin Smith 242*.

Training in the composition and delivery of speeches with special reference to the problems of interest and persuasion.

**[21. History of Rhetoric and Oratory.** First term. Credit three hours. Open by consent of the instructor to upperclassmen and graduates. Assistant Professor WICHELNS. Not given in 1930-31.]

**23. Classical Rhetoric.** First term. Credit three hours. Open by consent of the instructor to upperclassmen and graduates. Assistant Professor WICHELNS. T 11, Th 11-1. *Goldwin Smith 26*.

A study, in English translation, of ancient theories of public address, with special reference to Aristotle, Cicero, and Quintilian. Lectures, discussions, and reports.

**[25. British Orators.** Second term. Credit three hours. Open by consent of the instructor to upperclassmen and graduates. Assistant Professor WAGNER. Not given in 1930-31.]

**[27. American Orators.** Credit three hours. Not given in 1930-31.]

**31. Phonetics and Speech Training.** Second term. Credit three hours. Prerequisite, Public Speaking 8 and consent of the instructor. Mr. THOMAS. T Th S 10. *Goldwin Smith 26*.

A study of voice training and English phonetics, and of methods of improving normal and defective speech.

This course is recommended by the department to those intending to teach oral English, public speaking, and dramatics.

**41. Dramatic Interpretation.** First term. Credit three hours. Open to upperclassmen by consent of the instructor. Assistant Professor STANTON. M W F 2. *Morse, Stage Laboratory*.

Dramatic interpretation, and the related principles of stage direction and production. Lectures, readings, reports, and drill.

**42. Advanced Dramatic Interpretation.** Second term. For graduates. Professor DRUMMOND. Hours to be arranged.

**45. Dramatic Production.** Second term. Credit three hours. Prerequisite, Public Speaking 41 and the consent of the instructor. Assistant Professor STANTON. T Th 2; Laboratory W 1:40-4 or as arranged. *Morse, Stage Laboratory*.

The theory and practice of stage production. Lectures, demonstrations, reports, and laboratory exercises in stagecraft.

**46. Modern Theories of Stage Presentation.** Throughout the year. Prerequisite, Public Speaking 45 and the consent of the instructor. For graduates. Assistant Professor STANTON. Hours to be arranged.

Readings, reports, and laboratory problems.

**51. Problems and Methods.** First term. Credit two hours. For graduates; open to seniors by consent of the instructor. Assistant Professor WICHELNS. W 4-6. *Goldwin Smith* 21.

This course is recommended by the department to those intending to teach oral English, public speaking, and dramatics.

**60. Seminary in Rhetoric and Eloquence.** Throughout the year. Credit two hours a term. For graduates. Assistant Professor WICHELNS. T 3. *Goldwin Smith* 25.

[**63. Seminary in Speech Training.** Throughout the year. Credit two hours a term. For graduates. Assistant Professor MUCHMORE and Mr. THOMAS. Not given in 1930-31.]

**66. Seminary in Dramatic Production.** Second term. Credit two hours. For graduates. Professor DRUMMOND. M 4-6. *Morse*, Stage Laboratory.

**Dramatic Structure.** Professor SAMPSON. See English 90.

**Classical and Medieval Rhetoric.** Assistant Professor CAPLAN. See Greek 33 and Latin 33.

**Speech Clinic.** For students working under the supervision of the Department. By appointment. Mr. THOMAS. *Goldwin Smith* 28.

**Informal Study and Theses.** Qualified seniors may, with the approval of the department, register for informal study or theses in rhetoric, public address, speech training, or dramatic production.

Additional opportunities for training under the supervision of the department are provided by the University Prize Contests (the Woodford, the '86 Memorial, the '94 Memorial) in charge of Assistant Professor MUCHMORE, by the intercollegiate debate teams under the supervision of Assistant Professor WAGNER, and by the Cornell Dramatic Club under the direction of Professor DRUMMOND and Assistant Professor STAINTON.

## ROMANCE LANGUAGES

### FRENCH

*Students desiring the recommendation of the Department for teaching French are required to take the following courses: 16, 22, 23, 30 and a minimum of six hours of composition above French 5b.*

**\*1. Elementary Course.** Throughout the course. Credit six hours on completion of the course; upperclassmen, four hours. M W F 12, T Th S 8.

The course is continuous throughout the year and no credit is allowed for the first term alone. Students with first year entrance French should enter the course the second term.

**\*3. Intermediate Course.** First term only. Credit six hours; upperclassmen, four hours. Prerequisite, French 1, or second year entrance French. Daily 8, 9, 11.

**\*4a. Rapid Reading of French.** Repeated in second term. Credit three hours. Prerequisite, French 3, or third year entrance French. First term: M W F 9, M W F 12, T Th S 11. Second term: M W F 10, M W F 11, T Th S 9.

Translation and outside reading.

Designed primarily for students intending to continue the study of French. May not be taken except in conjunction with 5a.

**\*4b. Advanced Rapid Reading of French.** Repeated in second term. Credit three hours. Prerequisite, French 4a. First term: T Th S 11. Second term: T Th S 11.

Translation and outside reading.

**\*5a. Elementary Composition.** Repeated in second term. Credit three hours. Prerequisite, French 3, or third year entrance French. First term: M W F 11, T Th S 9, T Th S 12. Second term: M W F 8, M W F 9, T Th S 10, T Th S 11.

**\*5b. Elementary Composition.** Second term. Credit three hours. Prerequisite, French 5a or 6. M W F 11, T Th S 9, T Th S 10. *Goldwin Smith* 283.

\*6. **Freshman French: Translation and Composition.** Throughout the year. Credit six hours on completion of course. Prerequisite, French 3 or third year entrance French. Designed primarily for the satisfaction of underclass requirements in foreign languages. M W F 8, 9, 10, 12; T Th S 10, 11.

7. **Intermediate Composition.** Throughout the year. Credit three hours a term. Prerequisite, French 5b. Professor PUMPELLY. M W F 10, M W F 12. *Goldwin Smith 277.*

Composition, conversation, and discussion of selected topics in French grammar. Course 7 is conducted in French.

9. **Advanced Composition.** Throughout the year. Credit three hours a term. Prerequisite, French 7. Professor GUERLAC. M W F 10. *Goldwin Smith 283.*

Rapid translation from English; themes and talks by students on literary and historical topics. The course is conducted in French.

16. **History of French Literature.** Throughout the year. Credit three hours a term. Prerequisite, fourth year entrance French, French 4a, or French 6. Professor MASON. M W F 11. *Goldwin Smith B.*

Lectures on French Literature since the Middle Ages.

[17. **Literature of the Seventeenth Century.** Throughout the year. Credit three hours a term. Prerequisite, French 16. Professor GUERLAC. M W F 11. *Goldwin Smith 281.*

Lectures, outside reading, and reports. Not given in 1930-31.]

18. **Literature of the Eighteenth Century.** Throughout the year. Credit three hours. Prerequisite, French 16. Professor GUERLAC. M W F 11. *Goldwin Smith 281.*

Lectures, outside reading, and reports.

19. **The Romantic Movement in French Literature.** Throughout the year. Credit three hours a term. Prerequisite, French 16. Professor MASON. M W F 9. *Goldwin Smith 290.*

[20. **Modern French Literature.** Throughout the year. Credit three hours a term. Prerequisite, French 16. Professor MASON. M W F 9. *Goldwin Smith 290.* Not given in 1930-31.]

[21. **Contemporary French Literature.** Throughout the year. Credit three hours a term. Prerequisite, French 16. Professor MASON. M W F 9. *Goldwin Smith 290.* Not given in 1930-31.]

22. **French Phonetics.** Second term. Credit two hours. Professor MASON. M W 8. *Goldwin Smith 281.*

[23. **French Historical Grammar.** First term. Credit two hours. Professor PUMPELLY. T Th 10. *Goldwin Smith 277.*

Lectures on the historical development of French from its origins to the present. Primarily for students intending to teach French. Not given in 1930-31.]

24. **French Philology.** Throughout the year. Credit six hours on completion of course. Prerequisite, French 5a, 23 and entrance Latin. Professor PUMPELLY. T 10, Th 2.

Lectures on the historical development of the French language, with a detailed phonological and morphological study of the *Chanson de Roland*.

[30. **The Teaching of French.** Second term. Credit two hours. Professor MASON. M W 8. *Goldwin Smith 281.* Not given in 1930-31.]

[31. **Literature of the Sixteenth Century.** Throughout the year. Credit two hours a term. Prerequisite, French 16. Assistant Professor BISHOP. T Th 12. *Goldwin Smith 283.* Not given in 1930-31.]

35. **French Critics, Orators, Historians, and Moralists of Modern and Contemporary France.** First term. Credit two hours. Professor GUERLAC. T Th 11. *Goldwin Smith 283.*

Lectures in French with outside readings and reports.

36. **France of To-day.** Lectures in French. Second term. Credit two hours. Professor GUERLAC. T Th 11. *Goldwin Smith 283.*

La France d'aujourd'hui; le pays, la nation, les institutions, la vie intellectuelle, sociale, et politique. Outside readings and reports.

[37. **French Dramatists of the Nineteenth and Twentieth Centuries.** Lectures in French. Second term. Credit two hours. Professor GUERLAC. T Th 11. *Goldwin Smith* 283.

Outside readings and reports. Not given in 1930-31.]

41. **Old French Texts.** First term. Credit two hours. Primarily for graduates. Hours to be arranged. Professor HAMILTON.

43. **Old Provençal Philology and Literature.** Second term. Credit two hours. Hours to be arranged. Professor HAMILTON.

47. **Modern French Seminary.** Throughout the year. Credit two hours a term. Professor MASON. T 2:30. *Library, French Seminary.*

Primarily for graduates.

#### ITALIAN

\*1. **Elementary Course.** Throughout the year. Credit six hours on completion of course. Professor PUMPELLY. M W F 9. *Goldwin Smith* 283.

The course is continuous throughout the year and no credit will be allowed for the first term alone.

4. **Nineteenth Century Literature.** Throughout the year. Credit three hours a term. Prerequisite, Italian 1, or its equivalent. Professor HAMILTON. T Th S 9. *Goldwin Smith* 281.

Novels and criticism of the nineteenth century.

14. **Italian Poetry.** Throughout the year. Credit three hours a term. Prerequisite, Italian 4, or the equivalent. Professor HAMILTON. T Th 11. *Goldwin Smith* 281.

Dante, *Divina Commedia*; Leopardi, *Rime*; Carducci, *Poesie*, will be read in class. Readings and reports for extra-class work.

15. **The Literature of the Italian Renaissance.** Second term. Credit three hours. Prerequisite, Italian 14. Professor HAMILTON. Hours and room to be arranged.

Petrarch, *Rime*; Machiavelli, *Principe*; Ariosto, *Orlando Furioso*. Outside readings and reports.

#### SPANISH

\*1. **Elementary Course.** Throughout the year. Credit six hours on completion of the course; upperclassmen, four hours. Mr. DEILY. M W F 12, T Th S 9.

The course is continuous throughout the year and no credit is allowed for the first term alone. Students entering with one unit in Spanish should take the second term of course 1.

\*3. **Intermediate Course.** Credit six hours; upperclassmen, four hours. Prerequisite, Spanish 1, or second year entrance Spanish. Mr. DEILY. First term: daily 8.

\*4. **Advanced Translation.** Repeated in second term. Credit three hours a term. Prerequisite, Spanish 3, or third year entrance Spanish. First term: M W F 8; T Th S 12. Second term: T Th S 10.

Translation, outside reading of modern novels and plays.

\*5. **Elementary Composition.** Second term. Credit three hours. Prerequisite, Spanish 3 or third year entrance Spanish. Mr. FLORES. Second term: T Th S 11.

\*6. **Freshman Spanish.** Translation and Composition. Throughout the year. Credit six hours on completion of the course. Prerequisite, Spanish 3 or third year entrance Spanish. Designed primarily for the satisfaction of the underclass requirement in foreign language. M W F 9.

7a. **Intermediate Composition.** First term. Credit three hours a term. Prerequisite, Spanish 4 or 6. Mr. FLORES. T Th S 12. *Goldwin Smith* 277.

7b. **Intermediate Composition.** Second term. Credit three hours a term. Prerequisite, Spanish 7a. Mr. FLORES. T Th S 12. *Goldwin Smith* 281.



Courses 7a and 7b are conducted in Spanish. Special emphasis is placed on the attainment of accuracy and fluency in both written and oral expression.

9. **Contemporary Spanish Life.** Throughout the year. Credit three hours a term. Prerequisite, Spanish 7b. Mr. FLORES. M W F 11. *Goldwin Smith 277.* Course 9 is conducted entirely in Spanish.

[10. **History of Spanish Literature.** Throughout the year. Credit three hours a term. Prerequisite, Spanish 4 or 6. Professor DALE. M W F 12. *Goldwin Smith 283.* Not given in 1930-31.]

11. **Modern Spanish Drama.** Throughout the year. Credit three hours a term. Prerequisite, Spanish 4 or 6. Professor DALE. M W F 12. *Goldwin Smith 283.*

15. **Drama of the Golden Age.** First term. Credit three hours. Prerequisite, Spanish 4 or 6. Professor DALE. T Th S 11. *Goldwin Smith 277.*

17. **Cervantes.** Second term. Credit three hours. Prerequisite, Spanish 4 or 6. Professor DALE. T Th S 11. *Goldwin Smith 277.*

[19. **Prose of the Nineteenth Century.** Throughout the year. Credit three hours a term. Prerequisite, Spanish 4 or 6. Professor DALE. T Th S 10. *Goldwin Smith 281.* Not given in 1930-31.]

20. **Spanish Poetry.** Throughout the year. Credit three hours a term. Prerequisite, Spanish 4 or 6. Professor DALE. T Th S 10. *Goldwin Smith 281.*

[41. **Old Spanish.** Throughout the year. Credit two hours a term. Professor DALE. Primarily for graduates. Not given in 1930-31.]

[42. **Calderón and Alarcón.** Throughout the year. Credit two hours a term. Professor DALE. Primarily for graduates. Not given in 1930-31.]

43. **The Picaresque Novel.** Throughout the year. Credit two hours a term. Professor DALE. Th 2:15. *Library, Spanish Seminary.*

## SCANDINAVIAN LANGUAGES AND LITERATURES

1. **Old Icelandic.** Throughout the year. Credit three hours. Professor HERMANSSON. T Th S 11. *Library, Greek and Latin Seminary.*

[2. **Danish and Dano-Norwegian.** Throughout the year. Credit three hours. Professor HERMANSSON. Not given in 1930-31.]

3. **Swedish.** Throughout the year. Credit three hours. Professor HERMANSSON. M W F 11. *Library, Greek and Latin Seminary.*

4. **Norse Mythology.** First term. Credit two hours. Professor HERMANSSON. W F 12. *Goldwin Smith 177.*  
Lectures and readings.

[5. **Old Norse-Icelandic Literature.** First term. Credit two hours. Professor HERMANSSON. Not given in 1930-31.]

[6. **Modern Scandinavian Literature.** Second term. Credit two hours. Professor HERMANSSON. Not given in 1930-31.]

7. **Early Scandinavian Civilization and History.** Second term. Credit two hours. Professor HERMANSSON. W F 12. *Goldwin Smith 134.*

Lectures on the social and political conditions of the Scandinavian countries from the earliest time down to the end of the Middle Ages.

## SEMITIC LANGUAGES AND LITERATURES AND ORIENTAL HISTORY

1a. **Hebrew.** Throughout the year. Credit three hours. Professor SCHMIDT. M T Th 2. *Goldwin Smith 127.*

Open only to juniors, seniors, and graduates.

1b. **Advanced Hebrew.** Throughout the year. Credit two hours. Prerequisite, Semitics 1a. Professor SCHMIDT. T Th 8. *Goldwin Smith 127.*  
Leviticus, Jeremiah, Psalms.

2a. **Arabic.** Throughout the year. Credit two hours. Professor SCHMIDT. T Th 9. *Goldwin Smith 127.*

Open to juniors, seniors, and graduates.

2b. **Advanced Arabic.** Throughout the year. Credit two hours. Prerequisite, Semitics 2a. Professor SCHMIDT. W F 2. *Goldwin Smith 127.*

Selected suras in the Koran and Prolegomena of Ibn Khaldun.

3. **Ethiopic.** Throughout the year. Credit two hours. Prerequisite, Semitics 1a and 2a. Professor SCHMIDT. T Th 3. *Goldwin Smith 127.*

4a. **Assyrian.** Throughout the year. Credit two hours. Prerequisites, Semitics 1a and 2a. Professor SCHMIDT. T Th 4. *Goldwin Smith 127.*

4b. **Aramaic.** Throughout the year. Credit two hours. Prerequisite, Semitics 1a. Professor SCHMIDT. T Th 5. *Goldwin Smith 127.*

5a. **Egyptian.** Throughout the year. Credit two hours. Prerequisite, Semitics 1a and 2a. Professor SCHMIDT. W 4-6. *Goldwin Smith 127.*

Hieroglyphic texts. Primarily for graduates.

[5b. **Coptic.** Throughout the year. Credit two hours. Prerequisite, Semitics 5a. Professor SCHMIDT. W 4-6. *Goldwin Smith 127.*

Selections from the gospels. Not given in 1930-31.]

6. **Biblical Literature.** Throughout the year. Credit two hours. Professor SCHMIDT. M W 3. *Goldwin Smith 120.*

General introduction to the Bible. Open to juniors, seniors, and graduates. No knowledge is required of Semitic languages or of Greek.

7. **Semitic Seminary.** Throughout the year. Credit two hours. Prerequisite, Semitics 1a and 4b. Professor SCHMIDT. M 4-6. *Goldwin Smith 127.*

Carthaginian and Arabic inscriptions. Primarily for graduates.

8. **Comparative Semitic Philology.** Throughout the year. Credit two hours. Professor SCHMIDT. F 3-5. *Goldwin Smith 127.*

For graduates only.

[18. **Oriental History.** Throughout the year. Credit two hours a term. Professor SCHMIDT. A general survey of the history of Asia. Open only to juniors, seniors, and graduates. T Th 10. *Goldwin Smith B.* Not given in 1930-31.]

19. **Oriental History.** Throughout the year. Credit two hours a term. Professor SCHMIDT. A general survey of the history of Africa. Open only to juniors, seniors, and graduates. T Th 10. *Goldwin Smith B.*

# UNIVERSITY REQUIREMENTS FOR THE DEGREE A. B. AND B. CHEM.

## HYGIENE AND PREVENTIVE MEDICINE

All undergraduate students are required to present themselves to the Medical Advisers and receive a thorough confidential physical examination once a year. Appointments for this examination must be made during the regular registration days of the first term by all entering students and sophomores. Appointments for this examination must be made during the regular registration days of the second term by all juniors and seniors.

All students in the first year of undergraduate courses are required to attend a lecture-recitation course in Hygiene and Preventive Medicine given once a week throughout the college year. In the College of Arts and Sciences academic credit of one hour, each term, will be given for satisfactory completion of this work. The credit of two hours for Hygiene 1 and 2 will be included in the one hundred and twenty hours required for the A.B. degree, and added to the requirements for the B. Chem. degree (see page 18).

Hygiene 1 and 2, however, as well as Hygiene 3, 4, and 5 may not be counted in the ninety hours required in the College of Arts and Sciences, but must be counted as part of the thirty hours of electives allowed outside the College (see paragraph 1, page 12).

1. **Hygiene.** First term. Required of all freshmen. Credit one hour. One lecture-recitation each week, with preliminary examination and final. The use of a text-book will be required.

Students must report for registration and assignment to section, the men at the *Old Armory*, the women at *Sage Gymnasium*.

Sections for men: M 9, 10, 11, 12; T 9, 11, 12; W 8, 9, 10, 11, 12; Th 8, 9, 11, 12; F 8, 11; S 8, 9, 10, 12.

Sections for women: M 8; T 8, 10; Th 10, 2; F 9, 2; S 11.

2. **Hygiene.** Second term. Required of all freshmen. Credit one hour. One lecture-recitation each week, with preliminary examination and final. The use of a text-book will be required.

Students must report for registration and assignment to section, the men at the *Old Armory*, the women at *Sage Gymnasium*.

Sections for men: M 9, 10, 11, 12; T 9, 11, 12; W 8, 9, 11, 12; Th 9, 11, 12; F 8, 11, 12; S 8, 9, 10, 12.

Sections for women: M 8; T 8, 10; Th 10, 2; F 9, 2; S 11.

3. **Health Supervision of School Children.** Second term. Credit two hours. Assistant Professor GOULD. T Th 12. Histology lecture room, *Stimson*. Registration at Hygiene Office, *Old Armory*.

A practical course of lectures and demonstrations designed to familiarize the student with the facts and methods necessary for making an effective health supervision of school children. Prerequisites suggested but not demanded: Human Physiology and Anatomy. Open to sophomores, juniors, and seniors.

4. **Hygiene: Advanced First Aid.** Credit one hour. First term. Repeated in second term. Prerequisites, Hygiene 1 and 2, and Human Anatomy or Human Physiology. Enrollment limited, and registration only after conference with instructor in charge. First term: Section 1, T 12, *Anatomy Lecture Room, Stimson*. Section 2, F 9, *Anatomy Lecture Room, Stimson*. Second term: Section 1, W 8, *Anatomy Lecture Room, Stimson*, Section 2, S 9, *Anatomy Lecture Room, Stimson*. Assistant Professor SHOWACRE. This course includes the theory of the diagnosis and temporary treatment of the common emergencies with practical application of the essential fundamentals.

5. **Industrial Hygiene.** First term. Credit one hour. Assistant Professor GOULD. Th 12. Histology lecture room, *Stimson*. Registration at Hygiene Office, *Old Armory*. Prerequisites, Hygiene 1 and 2.

Factory sanitation, ventilation and illumination; occupational poisoning and disease; factory legislation; accident prevention; fatigue in industry; preventive medicine in the industries.

6. **School Hygiene.** Professor YOUNG. See Physical Education 24.

*The following courses, Hygiene 7 and 8, may not be included in the one hundred and twenty hours required for the A.B. degree.*

7. **Hygiene: Rural Hygiene.** Second term. Credit one hour. Prerequisites, Hygiene 1 and 2. W 12. *Anatomy lecture room, Stimson.* Registration at Hygiene office, *Old Armory.* Professor SMILEY.

A general consideration of the health problems peculiar to rural areas with the presentation of practical schemes for the solution of these problems as far as possible.

8. **Hygiene: Mental Hygiene.** First term. Credit one hour. Prerequisites, Hygiene 1 and 2. T 2. *Histology Lecture Room, Stimson.* Assistant Professor GWIN.

A study of the factors involved in the maintenance of mental health of the individual; i. e., satisfactory human relationships, attitudes, and behavior. Discussion of the causes and mechanisms underlying the more common personality deviations.

## MILITARY SCIENCE AND TACTICS

1. **Practical and Theoretical Training.** Throughout the year. Every able-bodied male student (except aliens), a candidate for a baccalaureate degree, who is required to take five, six, seven, eight, or more terms in residence (or the equivalent in scholastic hours), must take in addition to the scholastic requirements for the degree, one, two, three, or four terms respectively in the Department of Military Science and Tactics. Three hours a week, either M T W or Th 1:40-4:10 p. m. *New York State Drill Hall.*

The requirements in Military Science and Tactics must be completed in the first terms of residence; otherwise the student will not be permitted to register again in the University without the consent of the University Faculty.

The course of training is that prescribed by the War Department as basic for Infantry, Artillery and Signal Corps Units of the Reserve Officers' Training Corps. The Infantry includes instruction in military courtesy, command and leadership, physical training, ceremonies, rifle marksmanship, automatic rifle, musketry, scouting and patrolling, grenades, machine guns, the fundamental principles of minor tactics and leadership, and the National Defense Act. The Field Artillery includes instruction in organization of the battery, customs of the service, military courtesy and discipline, dismounted drill, drill of the gun squad including service of the piece, firing of a battery of French 75 mm. guns with service ammunition, gunner's examination, hippology, equitation and horsemanship, physical training, and topography. The Signal Corps consists of theoretical and practical instruction in military communications including visual, telephonic, and radio. This course is open only to students who have completed the first year basic training with another branch.

2. **Elective Military Training.** Throughout the year. Credit two hours a term. Hours by assignment. *New York State Drill Hall.*

This is the advanced course prescribed by the War Department for units of the Reserve Officers' Training Corps, and includes five hours each week of both theoretical and practical instruction. Prerequisite, course 1.

Course 2 may be elected only by permission of the Dean of the College of Arts and Sciences, and the Professor of Military Science and Tactics, but credit for this course may not be counted toward the ninety hours required in this College (see page 12). To enjoy the benefits offered by the Federal Government the student must agree to continue the course for four terms, and to attend one summer camp having a duration of about six weeks. Upon the completion of this course the student is eligible for a commission as Second Lieutenant in the Officers' Reserve Corps.

PHYSICAL TRAINING FOR MEN

1. **For Freshmen Excused from Drill.** Throughout the year. Three periods a week. Class and squad work and prescribed exercises. Mr. O'CONNELL and assistants.
2. **For Sophomores Excused from Drill.** Throughout the year. Three periods a week. Class and squad work and prescribed exercises. Mr. O'CONNELL and assistants.
3. **For Juniors and Seniors.** Building up and corrective exercises as prescribed by the Medical Examiners as a result of the physical examination required of all students in the University. Mr. CHAMBERLAIN.
4. **Boxing, Wrestling, and Fencing.** Instruction 3-6 daily except Saturday. Mr. FALLON, Mr. O'CONNELL, and Mr. DARRIEULAT.

PHYSICAL TRAINING FOR WOMEN

6. **For Freshmen.** Throughout the year. Three periods a week. Miss BATEMAN, Miss CANFIELD, Miss READ, Miss DANIELS, and Miss RYAN.

7. **For Sophomores.** Throughout the year. Three periods a week. Miss BATEMAN, Miss CANFIELD, Miss READ, Miss DANIELS, and Miss RYAN.

The work of the two years consists of outdoor sports from the beginning of the year to Thanksgiving, and from Easter vacation to the end of the year. From Thanksgiving to Easter, the work is indoors, and consists of gymnastic exercises, folk, aesthetic, and interpretative dancing, indoor games, and apparatus work. Corrective exercises as prescribed by the Medical Examiners as a result of the physical examination required of all students in the University. Miss DANIELS.

For further information as to the required work in physical training, see the handbook issued by the Department.



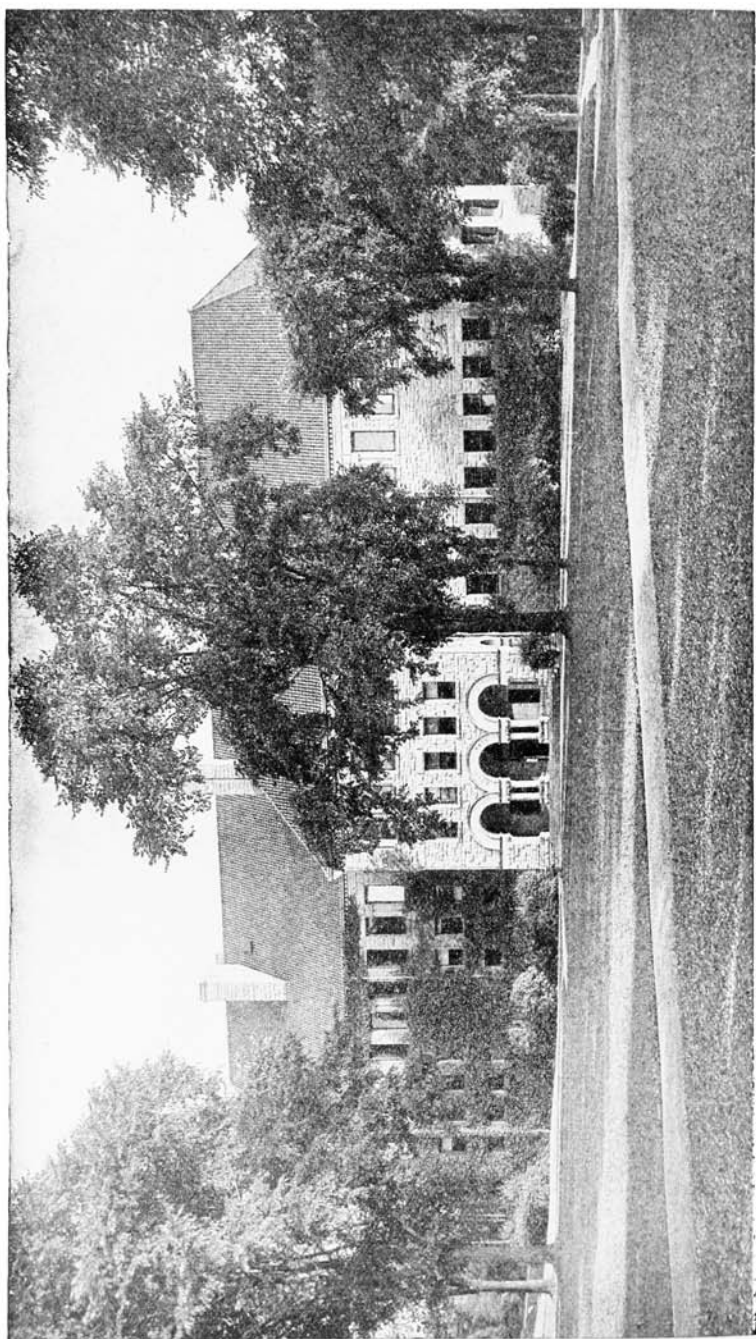
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BOARDMAN HALL, THE CORNELL LAW SCHOOL